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PRE-FEASIBILITY STUDY OF
FISH PROCESSING IN THE
ECONOMIC COMMUNITY OF WEST AFRICAN STATES

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PREFACE

The objectives of the study as defined by USAID and ECOWAS are relevant and ambitious. Unfortunately, paucity of data, logistical difficulties encountered, and the number of countries visited within a limited time frame and budget resulted in the inability to develop specific quantitative data in relation to fish processing. Given these limitations, the author concentrated on those factors most critical to the evaluation of operating industries and those parameters critical to future development of the industry.

The initial objectives of the study could not be met within the budgeted time and resources allocated to the project, both human and monetary. Lack of existing data on fish processing, prices, and costs, were principal factors in not meeting the specific measurement of some of the feasibility parameters envisioned in the project scope. Primary data collection and sources remain to be developed.

The problems encountered were reported to AID Africa Bureau in an interim report dated March 17, 1982. Because of these difficulties, the author relied on many years of experience throughout the world, and first-hand observation of existing market and production conditions.

The principal emphasis of the report has been placed on confirming the prerequisite conditions for future development of the industry in ECOWAS member states, primary constraints to development of the industry, and recommendations to ECOWAS as a focus for regional development of the industry.

The assistance of Mr. Christian Marie Santos of ECOWAS was invaluable to the author in conducting this regional study. Without his assistance as interpreter and his knowledge of the countries visited, the objective of the study could not have been accomplished. Appreciation is also expressed to the ECOWAS Coordinators in the countries visited for their time and effort spent in arranging interviews and visits.

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EXECUTIVE SUMMARY

The coastal member states of the Economic Community of West African States (ECOWAS) have one of the world's largest and most abundant fishing grounds. The potential catch has been estimated at 4.7 million tons annually. The consumption of fish constitutes as much as 50% and more of protein consumption in the coastal states of West Africa.

The region's fishing resources are exploited principally by non-African countries including the USSR, Spain, South Korea, Poland, Rumania, Japan and Bulgaria. The catch of these countries's fleets is not, for the most part, landed or processed in West Africa. It has been reported that much of the fisheries resources in West Africa is fully to overly exploited with very little benefit to West African states.

The artisanal fisheries (traditional canoe fishing) of the coastal states account for 75% of the fish landed in West Africa, but account for less than 50% of the total catch for the region. Inland fishing in lakes, rivers, and lagoons is an important contribution to fish supplies in all ECOWAS member states.

The fish processing industry is operating at 60% of capacity or less. This is due to a lack of landings by foreign vessels operating in West African waters and the small number of West African-based commercial fishing vessels. The artisanal catch is sold fresh and also processed through traditional methods of smoking and sun drying. It has been estimated that 50% of the artisanal catch is lost through spoilage, insects and rodents. The lack of adequate processing facilities is a barrier to the development of artisanal fishing.

Inland fisheries and aquaculture represent an unexploited resource in West African nations. Considerable interest has been expressed in aquaculture, but it has received a low priority in development policy and even less in funding. Commercial methods of fish farming with rapid growth hybrid species adaptable to the West African environment have been developed in the United States. This technology has not been transferred to West Africa.

Processing facilities in West Africa meet international standards, but are operating at less than capacity. Trade in fish and processed fish products, for the most part, is between European and East European countries, the USSR, and ECOWAS states. Very little intra-regional trade currently exists. The only West African products encountered were frozen and canned fish products from Senegal.

The barriers to increased intra-regional trade and the development of a commercial viable fish processing industry in West Africa are political, economic and technical in nature. These barriers are:

(1) Lack of a consistent and unified policy among West African States for the management of existing fish stocks shared by member states limits the development of a commercial viable fish processing industry.

(2) Lack of cooperation among West African countries on uniform fishing regulations, licensing and fees, and reciprocity agreements limits commercial scale African enterprises that must compete with foreign fleets for viable fish resources in the region's waters.

(3) A shortage of West African vessels, high fuel costs and foreign competition for the resource has restricted landings of fish for the existing indigenous processing industry.

(4) The lack of market infrastructure, particularly reliable and economic modes of transportation between member states, is a principal barrier to increased inter-regional trade in fish and fish products.

ECOWAS as a regional organization can play a substantial role in the development of the West African fishing industry. It is recommended that ECOWAS develop programs as follows:

(1) West African commercial fishing vessels are not sufficiently numerous to meet the existing demand for fish for processing in the region's facilities. Investment funds are needed to add more vessels to satisfy this demand and to streamline shore facilities for their maintenance and repair. This can best be approached through regional cooperation rather than through a country-by-country approach.

(2) Technologies exist that duplicate the traditional methods of processing the artisanal catch that are relatively simple and have low capital requirements. These technologies are applicable to all the member countries of ECOWAS. ECOWAS can encourage the use of these technologies through the development of regional demonstration projects and technical assistance.

(3) A regional program concerned with stock assessment, surveillance and professional training offers economies of scale and levels of activity that could not be obtained on a country-by-country basis given the limited resources available.

(4) ECOWAS should take the lead in establishing a dialogue among member countries to reach a consistent set of regulations, licensing fee structures, and resource management among its member countries and their fisheries' resource.

(5) Aquaculture is of interest and applicable in all ECOWAS member states. ECOWAS sponsorship of a demonstration project concurrent with appropriate processing technology on a regional basis would encourage development of this resource through private sector activity.

INTRODUCTION

West Africa has one of the world's largest and most abundant coastal fishing grounds. Potential catch from the Eastern Central Atlantic (CECAF Region) has been estimated at 4.7 million tons annually. The consumption of fish constitutes as much as 50% and more of protein consumption in the coastal states of West Africa.

The region's fishing resources are exploited principally by non-African countries including the USSR, Spain, South Korea, Poland, Rumania, Japan and Bulgaria. The catch of these countries' fleets are for the most part not landed or processed in West Africa. This study was formulated to investigate the current state of the fish processing industry in West African states and the feasibility of future development.

Objectives

The objective of the study was to analyze the feasibility of fish processing in West Africa from a regional perspective. Factors to be considered were as follows:

1. Supply of Raw Material.
2. Demand for fish and processed fish products.
3. Determine the location, characteristics and performance of existing West African facilities.
4. The size and number of processing units needed for West African market.
5. Review of the role of ECOWAS and how the organization can best stimulate regional processing.

Methodology

During the course of the study ten countries were visited over a ten week period. The countries visited were as follows:

- Nigeria
- Senegal
- Ivory Coast
- Liberia
- Niger
- Mauritania
- Sierra Leone
- Ghana
- Mali
- Upper Volta

Interviews were held with Government Ministries, private companies and parastatal corporations. In addition, dock facilities, processing plants and markets were visited. Statistics on fisheries were found to be practically non-existent. The best source encountered for catch-by-species are the CEEAF statistical bulletins through the United Nations' Food and Agriculture Organization.

It is necessary when considering the fish processing industry to distinguish between the commercial fishing sector and the artisanal sector. Indications are that artisanal fishing operations comprise 75% of the landings in West Africa, but less than 50% of the estimated total catch.

Because of the inter-relationship encountered, it is also essential to consider inland fisheries and fish culture activities as part of the analysis of the potential for fish processing.

It is suggested that readers of this report review in-depth the publications listed below in conjunction with this report. The conclusions and recommendations contained in these reports are complementary and additive to this report. These publications are:

- 1) Golley-Morgan, Ethan, T. A.; Report on the Establishment of a Regional Fisheries Center for ECOWAS: Economic Community of West African States, Lagos, June 1981.
- 2) Sutinen, Pollnac and Josserand; The Fisheries of West Africa and Prospects for Development; International Center for Marine Resources Development, University of Rhode Island (Draft Publication, USAID, Washington, D.C.).

II. SUPPLY CHARACTERISTICS OF ECOWAS FISHERIES

It has been estimated by CECAF that the biological potential of ocean fisheries resources off the coastal countries of West Africa exceed 4 million metric tons per year. Thus the CECAF region which comprises the coastal member states of ECOWAS have one of the richest ocean fisheries in the world. It has also been reported that much of this resource is fully to overly exploited. The bulk of the catch is not landed nor processed in West Africa. The artisanal fisheries in the coastal states account for 75% and more of total landings of ocean fish, but have less than 50% of the total catch for the region.

The northern region of ECOWAS is richest in fish resources (about 75% of the total) while the southern zone has the largest share of the population (over 90% by some estimates). In terms of trade balance, Mauritania, Senegal, Gambia, and Guinea Bissau had a positive balance while all other member coastal states of ECOWAS were net importers of fish.

It is interesting to note that trade in fish is quite limited between ECOWAS surplus and deficit producing countries. The major portion of surplus is exported to Europe and other areas of the world. The major suppliers of

imports to the southern zone have been the USSR, East European countries and Japan.¹

Several of the southern tier countries which are deficit in fish resources in their waters have developed distant water fleets. These include Ghana, Ivory Coast and Nigeria. The high cost of fuel and decreasing catch over the past few years has placed these distant water fleets in jeopardy. Competition for fish and the high cost of fishing rights in other nations' waters has slowed the fleet of Ghana whose catch in terms of tonnage landed has declined drastically over the five years.²

Interviews with Government Ministries and fishermen indicates that the region is probably becoming over fished for many species. Various boat owners and companies, both African and of foreign origin, stated that fish caught are becoming smaller each year and greater distances must be covered to make the catch.

Inland fishing in all the ECOWAS countries' rivers, lakes, and lagoons is an important supply source for fish. With the exception of Ghana which has a commercial fishing program on Lake Volta, inland fishing is an artisanal activity. Discussions with fisheries' officials in ECOWAS countries indicate that this resource is not being fully exploited. Considerable interest was also expressed in fish culture or fish farming in inland waters. In most countries, however, this activity has received low priority and few development funds. The exploitation of these inland fish resources is severely limited by the lack of efficient means to process the catch. It is estimated that as much as 40% of the total catch is lost through spoilage, insects and rodents.³

¹ Sutinen et al.

² Interviews with the Ministry of Fisheries, Ghana.

³ Sutinen et al.

III. DEMAND FOR FISH AND FISH PRODUCTS

Fish is a very desirable food product in ECOWAS member states with the exception of Mauritania. The people of Mauritania have a tradition of not eating fish. This has diminished in recent years, but consumption per capita is well below that of other West African states. Fish is a low priced alternative source of protein in the West African states compared with red meat and poultry.

It is expected that the demand for fish and fish products will increase in proportion to the increases in income and population. In the southernmost states of ECOWAS, Togo, Benin and Nigeria, it is expected that this increase will be more than proportional as alternate sources of protein, particularly red meat, fails to keep pace with increases in demand.¹

IV. MARKETING AND DISTRIBUTION SYSTEM FOR FISH

The region's marketing and distribution of fish is marked by a dominance of industrial exports in the northern states (Mauritania and Senegal) and of industrial imports supplementing sizable artisanal supplies in the southern zone. This pattern is a result of rich fish resources in the northern states with low population and poorer fish resources in the southern states with the largest share of population for the region.

It is important to distinguish product form by the three sources of supply. The landings of artisanal fleets are fresh usually without any form of refrigeration. Product from industrial fleets are chilled and frozen. Imports and landings from foreign vessels are almost exclusively frozen. Imports take the form of frozen, canned and dried fish.

¹ Sutinen et al.

In the two northernmost states, Senegal and Mauritania, the landings by the artisanal fleet are directly consumed in fresh form locally. As one moves south along the coastal states, a greater and greater proportion of the artisanal catch is smoked, sun-dried or salted.

Movement of fish to inland population centers is extremely limited in most countries. Nigeria, Ghana and Ivory Coast have been developing cold storage locations for fish and meat products, but these facilities are very limited. Refrigerated transport for these products is extremely limited and very costly.

In the coastal states the traditional method of distribution to inland locations is smoked or sun-dried fish purchased by market women and then transported by foot or rural systems of transportation. Losses due to spoilage, insects, and rodents is as high as 40% to 50% during the marketing process. The traditional methods of smoking and sun-drying gives a shelf life of the product of about 7 days without storage or packaging facilities which are seldom available.¹

Interviews with fisheries personnel and local fishermen indicated that during good fishing seasons, less desirable species of fish are thrown away or buried on the beach because of the lack of processing facilities and storage facilities for the artisanal catch. As distance from the coast increases, less fish and fish products are available in the local markets. The limited supply of ocean fish is supplemented by local fishing in rivers and lagoons in inland locations.

¹ Interview with Food Technologist, Fisheries Division, Ministry of Natural Resources, Freetown, Sierra Leone.

Trade in fish and fish products between ECOWAS member states is slowly increasing. Senegal is the main source of imports for deficit ECOWAS member states. Fish in canned and frozen form from Senegal were observed in most of the southern coastal states and the inland states of Mali, Upper Volta, and Niger. The products observed were frozen bulk fish, packaged frozen filets, and canned fish products including sardines and mackerel. Canned tuna products from the Ivory Coast were also observed in inland countries. The tuna products, however, bore French brand names, but were imported from Ivory Coast rather than directly from France.

Although Mauritania is the largest exporter of fish and fish products in ECOWAS, products from Mauritania, if traded in ECOWAS states, are imported from Las Palmas and European processors. Transportation links between Mauritania's fishing center and other West African states are virtually non-existent.

Interviews with fish processors in Senegal stated that with greater landings, increased trade in fish and fish products with ECOWAS member states would flourish. The lack of transportation facilities for exports have been a barrier to increased intra-regional trade from Mauritanian sources.

V. PROCESSING FACILITIES

Processing facilities for ocean fish exist in most West African coastal states. In southern states, these facilities are for freezing. In Abidjan in the Ivory Coast, a major tuna canning facility is operating. Senegal has had a substantial development of frozen and packaged facilities and fish canning facilities. Mauritania has both frozen and canning facilities.

In general, fish processing facilities in West Africa meet international standards. In part, many of the currently operating companies process fish and pack it under agreements with European food processing and marketing

companies. These activities are principally high value frozen filets, such as sole, shrimp and prawns, and canned tuna, sardines, mackerel and pilchards. The fish processing industry is operating substantially below its capacity. Industrial capacity was estimated to be utilized at 60% by fisheries experts in Mauritania, Senegal and the Ivory Coast. The principal limitation for the processing industry is a deficit of landings of fish for processing.

In Mauritania, a policy has been established that requires foreign nations fishing in Mauritanian waters to build shore facilities for the processing of fish in Mauritania. These facilities have been built in Nouadhibou, the major fishing center. However, these facilities are not being utilized. It appears that foreign vessels fishing Mauritanian waters prefer on board processing or transport fish caught to facilities in Las Palmas or European ports. Mauritania like most West African nations does not have enough of its own commercial fishing vessels to develop its own landings of fish for processing.

Senegal has the largest number of fish processing facilities in West Africa. These include several canning facilities, facilities for frozen filets and packaging and freezing plants for shrimp and bulk fish. The principal limitation on the industry is the large number of foreign vessels fishing in Senegalese waters and the lack of landings. An increase in Senegalese vessels and/or landings from foreign vessels is needed to permit companies to fully utilize their processing facilities. Canned products produced by Senegalese companies are of high quality and compare favorably with European processed products similar in nature.

Sierra Leone has well developed freezing facilities for shrimp and fish caught in its waters. The facilities are under utilized. Interviews with fishing company personnel indicated that increased distances that must be

traveled and a trend towards smaller size fish being caught may force the industry to close down due to increased costs. Intensive fishing by foreign vessels in Sierra Leone waters is indicated as the cause of decreased catch of fish and shrimp. Foreign landings of fish in Sierra Leone are very limited.

The commercial fishing industry in Liberia is not operating. Although fish resources in Liberian waters are limited, the country was once self-sufficient in fish production. A large fish and shrimp processing facility in Monrovia that meets international standards is not operating due to a lack of capital. The company (Mesurado Fishing Co. Ltd.) has 17 shrimpers of which only 3 are operating. The company currently imports frozen fish from Sierra Leone and distributes the fish in Monrovia out of its cold storage facilities. The general manager of the company stated that \$500,000 in capital is needed to repair vessels and put the plant back on a working basis.

The Ivory Coast has developed a substantial tuna canning industry. Although the waters of the Ivory Coast are limited in fish resources, it has become the major center in West Africa for tuna. Canned tuna is considered a luxury item in West African countries and consumption is very low. Tuna is canned by Ivorian joint venture companies for European markets. Co-packing is done for several major European food processing companies.

It was stated that only 25% of the tuna catch is processed in the Ivory Coast. The bulk of the catch is shipped to be processed in the United States and other countries. U.S. companies fishing in Ivorian waters ship the tuna to U.S. processing plants to mix with high mercury content tuna caught off the U.S. coast to lower the mercury content of the finished product to U.S. standards. Tuna companies interviewed in the Ivory Coast stated that limitation on their operations is the lack of foreign landings of tuna and a lack

of Ivorian tuna vessels. Expansion of the tuna canning industry in the Ivory Coast will be predicated on these companies catching their own tuna.

Nigeria has a well developed fishing and fish processing industry. It has the largest distant water fleet in West Africa. Nigeria, however, has limited fish resources in its waters and will continue to be a net importer of fish and fish products in the future.

A major opportunity exists in West African states for the processing of the artisanal catch of ocean fish and exploiting and processing of inland fish resources. As stated previously, 20% of the artisanal catch in coastal areas is lost due to spoilage. Additionally, 40% to 50% of artisanal-processed (through traditional methods) fish is lost through spoilage, insects and rodents.

The supply of fish available to the public can be substantially increased through increased utilization and improved processing of the existing catch. Processing technology exists that is low cost, and requires low levels of capital investment and training.

In Sierra Leone, the processing section of the Fisheries Division, Ministry of Natural Resources, has developed a low cost method of smoking fish in semi-controlled conditions. The process consists of a kiln or oven that can be built from locally available materials. The cost of the oven which can process 300 to 500 pounds of fish in a 4-hour period is \$350 to \$500. By controlling the smoke in a closed environment the process cuts 8 hours from traditional methods of smoking and uses less than a third of the fuel. The resulting product is superior in flavor and has a greatly increased shelf life in normal marketing conditions. Information on the method can be obtained from Mr. A.H. Robbie, Fisheries Officer, Freetown, Sierra Leone.

The processing method has application throughout West Africa. The basic equipment is simple to build, requires little capital and is a substantial improvement over traditional smoking and drying methods currently being used. Limited experience in Sierra Leone, due to lack of capital, indicate that traditional market women will bring their fish to be smoked and pay a fee for doing so. The product appears to carry good consumer acceptance in the market place.

In a recent West African Fisheries Workshop, an innovative technique for processing fish (which includes skinning, boning, and smoking) yielding a shelf life of 60 days was described. This technique as described is not technically sophisticated, nor does it require large capital outlays. This technology could be applicable throughout West Africa to the artisanal coastal fishing, and inland species as well. Mr. John Spinelli, National Marine Fisheries Service, Seattle, Washington, is a contact point for further information.

Aquaculture in ECOWAS member states is an area of increasing interest. Small scale projects exist in most of the southern coastal states including Sierra Leone, Liberia, Ivory Coast, and Nigeria. This appears to be a very viable source of potential protein using resources readily available in ECOWAS countries. Limited funding has been available for these projects and they have been given a low priority in development planning. Aquaculture or fish farming coupled with appropriate processing techniques could be a viable investment alternative. The market for dried and smoked fish in inland areas of ECOWAS states is very high. Adequate supply with increased shelf life to overcome market and infrastructure inefficiency would be a giant step forward in getting protein to deficient inland areas.

A new hybrid fish, Golde T. Mossambia Tilapia, has recently been developed. This hybrid is being bred and developed commercially. Growers have achieved a marketable weight of 1.5 lbs after 6.5 to 7.5 months growing time. Aquatic Hybrid Fish Farm of Scottsdale, Arizona is one of the firms with indepth experience in Tilapia. No contact has been made with this firm during the course of this study. Contact can be made to the address stated above or to Mr. Richard C. Whittington, Post Office Box 35, Bellaire, Texas 77401, USA.

VI. CONSTRAINTS TO DEVELOPMENT OF FISH PROCESSING

Constraints to development of fish processing in West Africa are political, economic and technical in nature. It is felt that these constraints could best be addressed and progress made towards resolution through a regional approach. These constraints are as follows:

(1) In areas where abundant fish stocks are shared by several adjacent coastal states, the conservation and proper management of stocks by the states requires cooperation and consistency of policy towards these stocks by the individual states. The exploitation of regional stocks by a nation's domestic fleet and by foreign fleets has implications to neighboring states. Without a consistent and unified policy among West African States, a processing industry based in the region will not develop to its full potential.

(2) Lack of cooperation among African countries on uniform fishing regulations, licensing and fees, and reciprocity agreements tends to limit commercial scale enterprises that must compete with foreign fleets for available fish resources in the region's waters.

(3) In theory and policy, access to fishing rights by foreign fleets in West African waters is controlled by licensing and fees. In addition, most agreements require landing of a specified percentage of the catch at

West African ports. Some agreements require the construction of shore facilities and processing facilities. In reality, the terms of these agreements are not being met. Interviews with officials from Ministry of Fisheries in several countries, private and parastatal fishing companies indicate that agreements are not being honored. Non-licensed vessels are fishing West African waters and the required percentage of catch is not being landed. The West African fishing industry and processing industry cannot develop in this environment. The regional waters of ECOWAS member states are being fully exploited or overfished with very little benefit to West African nations.

(4) A shortage of West African vessels, high fuel costs and foreign competition for the resource that is being taken from West African waters has left a condition of over capacity in existing processing facilities.

VII. CONCLUSIONS AND RECOMMENDATIONS

The coastal member states of ECOWAS have one of the richest ocean fisheries in the world. Exploitation of this resource by foreign fishing fleets has hindered the development of the West African fishing and fish processing industries. Adequate facilities that meet international standards exist in ECOWAS member states but are not being utilized to full capacity. Discussions with government officials and with fish processing firms indicate that tonnage of fish processed could increase as much as 50% above current levels without additional investment in facilities or equipment.

West African commercial fishing vessels are not sufficient to meet the demand for fish for processing. Investment funds are needed for additional fishing vessels and shore facilities for maintenance and repair.

Processing of the artisanal catch in West African states is through traditional smoking and sun drying. The total supply of fish available for

local markets in the region could be substantially increased through more efficient methods of processing and low levels of packaging. Technologies exist that essentially duplicate the traditional drying and smoking. These technologies require minimum levels of training and low levels of capital infusion. These technologies are applicable to small scale processing activities at the local fishing village level. It appears with preliminary analysis that the increased amount of fish available through a longer shelf life would make this activity a viable economic enterprise.

Aquaculture in inland lagoons, ponds and rivers is an unexploited resource in West Africa. This activity in conjunction with processing technology presents an opportunity to greatly improve the protein level of inland communities. Hybrid fish stocks are available that provide rapid growth levels. These species, principally Tilapia and common carp, are native to or adapt easily to the West African environment.

Trade in fish and fish products between coastal states and the inland states of ECOWAS will continue at minimal levels. The lack of infrastructure, particularly regular, economic modes of transportation is the principal barrier to increased trade.

ECOWAS as a regional organization is in a unique position to stimulate the development of the fishing industry and the fish processing industry in its member states.

It is recommended that ECOWAS develop programs as follows:

- (1) There are substantial economies of scale to be obtained in a regional program concerned with stock assessment, surveillance of waters and professional training. Currently, each coastal country has its own program of fisheries research, stock assessment and surveillance of waters. Professional training has progressed to a limited extent on a regional basis.

The level of funding and resources available, including trained personnel and vessels on an individual country basis, places these research and surveillance activities at an inadequate level. Pooling of resources on a regional basis would provide a higher level of these activities and help ameliorate one of the major barriers to the development of the fishing and fish processing industries.

(2) ECOWAS can, through its regional structure, develop a consistent set of regulations, licensing and fee structures, etc., that will benefit all countries in the region. Consistency in regulations and management of the fisheries resource is critical to future development and investment in a West African based fisheries industry.

(3) ECOWAS is in a unique position to promote and develop existing technologies of fish processing in the artisanal sector of the industry that have applicability to all ECOWAS member countries. This could be accomplished through demonstration projects and the promotion of small scale private enterprise using these technologies.

(4) Aquaculture is of interest and applicability in all ECOWAS member states. ECOWAS sponsorship of a demonstration project concurrent with development of processing technology would be appropriate. The technologies exist and are adaptable to West Africa. A demonstration project would encourage the development of aquaculture in member countries. It is very probable that private companies or investors can be encouraged to fund these demonstration projects with assistance from ECOWAS.