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FISH PROCESSING ACTIVITY IN THE LESS DEVELOPED COUNTRIES AND THE CASE OF ANTIGUA FISHERIES LIMITED

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The economies of the Less Developed Countries (LDCs) of the Caricom Region are dependent mainly on export agriculture and tourism. Manufacturing has been of tertiary importance with cottage type industries dominating this sector.

While fishing has always been of some importance, it has been largely a subsistence activity. In the last two decades, however, fishing has been increasing in importance to these countries.

It has been estimated that only 40 per cent of the needs for fishery products in the Caricom Region is produced locally and the rest has to be imported. Fish forms an important item in the diet of most people in the region. However, the imports are decreasing as a result of the scarcity of foreign exchange and increase in prices on the international markets. In many countries this has resulted in the reduction of protein intake, particularly among the poorer segments of populations. These factors, together with the recognised need for diversification of the rather narrowly based economies of the countries, have caused serious consideration to be given to the possibilities for increasing fishery production.

Among the aims of the Regional Food and Nutrition Strategy are the reduction in the volume of imports and improvement in the nutritional level of the population. Governments in the region have recognised the development of fisheries as a means of meeting some of the countries' food

requirements, in particular, providing a relatively cheap source of protein, of reducing the dependence on imports, and creating much needed employment opportunities.

The total annual regional imports in 1980 of fish comprising mainly fresh, chilled or frozen, dried, salted or smoked and canned fish, were valued at approximately TT\$70 million, equivalent to 31,000 tonnes of fresh fish. The potential availability of fish is estimated at 225,000 tonnes, so that with proper exploitation and the provision of adequate handling and processing facilities, the region can meet its demand.

The basic philosophy of a community of nations such as the Caribbean Community requires that attention be paid to the national resources, in this case the living marine resources, for the benefit of the entire Community. Seen against the background of community philosophy, regional fisheries projects provide, in theory, the opportunity for all Member Countries to participate in the exploitation of the region's resources for the purpose of improving fish supplies, both to the community as a whole, and to each of the member countries; and the opportunity to reduce the dependence on imports from non-Caricom countries.

However, a report by Fisheries Development Limited of the United Kingdom to identify the state of readiness of member governments to participate in three regional fisheries projects proposed by the Caribbean

Development Bank (CDB), showed that there was a lack of interest by governments in the proposed regional fishing project. It was therefore suggested that the overall objective of the Caribbean Food Plan, for which the regional fisheries projects were designed, could be better realized by the development of national fishing industries.

Resource Base

No definite information is available on the extent of the resource base collectively available to the Caricom territories. Most of the studies which were conducted, focussed on the wider Caribbean; and as mentioned before, the potential availability of fish is estimated at 225,000 tonnes. However, in the opinion of fisheries personnel, some areas are definitely underexploited while others (the banks off Jamaica) are being seriously overfished.

In most countries, a significant percentage of the fish landed, consists of pelagics caught during January to June. The remainder of the catch are demersals, harvested mainly during the latter six months of the year. There is evidence that larger pelagics inhabit the deeper waters off shore. These are fished, not by local fishermen but by Third Countries who poach in these waters. This illegal activity has recently been the source of concern to the region's Ministers of Agriculture who, at a special meeting in Barbados in May 1983 recognised that it would be desirable to control the exploitation of marine resources by extra-regional powers on a coordinated regional basis and mandated the Caricom Secretariat to

- (a) detail the issues associated with this problem
- (b) make recommendations for a coordinated approach to the protection and exploitation of regional marine resources.

Initial attempts at developing the fisheries subsector could be aimed at increasing the current level of

exploitation given the available resources. The fisheries subsector is serviced by both artisanal and industrial fishermen. The majority of fish landed is harvested by the artisanal fleets which exist in each Member State. Only four Caricom countries have industrial fleets. The annual regional production of fish was estimated in 1980 at 50,000 tonnes with the majority of this being landed by artisanal fishermen.

Characteristics of Existing Fishery in the LDCs

- (1) Low productivity of the waters because of the limited nutrient supply
The islands contribute a small nutrient input from sporadic run-off which is largely utilized by the inshore reef system. There is also no effective upwelling so that the food chain is restrained by the overall low productivity.
- (2) The stocks of pelagic fish within the range of the fishermen's small boats are limited and the fishery is almost exclusively based on bottom fishing of shallow reefs. Stocks of seasonally migrating pelagic fish are sufficiently available to permit commercial exploitation, but the necessary expertise is virtually non-existent in the area.
- (3) The population of demersal (bottom) fish which inhabit the shallow reefs make up the major portion of the inshore landings. Because of the association of these stocks of fish with areas of rocky or coral bottoms and steep drop-offs, the fishing techniques and gear that can be employed are limited. Hence the traditional commercial fishery uses mainly traps; although recently, handlines are increasingly being introduced.
- (4) Prolonged fishing pressure has depleted the limited stocks on the shallow inshore reefs in some

areas and fishermen generally do not have appropriate equipment to exploit the deep slopes.

- (5) Reef associated fishery imposes a hazard of ciguatera fish poisoning. Intoxication occurs from fish caught in certain localities and a number of important food fish have been implicated. This has been linked with the demersal food chain and a Dinoflagellate has been identified as the causative agent. Most of the commonly implicated species are reported to prey primarily on smaller fish and for a suspect species the larger specimens are more likely to be toxic and generally cause the most severe illness.
- (6) Constraints limiting increased harvesting are related to the inadequate available facilities such as:
 - (a) the limited size and poor design of the boats and the type of gear used;
 - (b) lack of slipways, landing, repair and maintenance facilities for the boats;
 - (c) lack of adequate storage facilities both on the boats and on shore;
 - (d) lack of adequate transportation;
 - (e) lack of investment capital to undertake needed improvement to market (including processing facilities);
 - (f) lack of human resources with experience in fish marketing.
- (7) Most of the fish caught is consumed near the points of landing due to the absence of suitable marketing facilities (processing, cold storage, refrigeration, trucking, etc.). This existing situation with respect to marketing and distribution of fish influences significantly the degree of effort that a fisherman would extend.

Several of the countries impose controls on the wholesale and retail price of fresh fish. In these countries the fixing of prices is intended to assist the low income consumers in obtaining much needed protein. However, the system works to the disadvantage of this group of consumers. Most fishermen are dissatisfied with the margins fixed which are considered too low. Consequently the fishermen either limit their catches or disregard the regulation. Both of these courses of action result in a smaller supply of fish to the low income consumers since in the first instance less fish is available for purchases at the regulated price, while in the latter case a smaller quantity can be purchased at the higher unregulated price.

Fishermen are extremely reluctant to increase fish landings since the marketing system cannot accommodate greater catches.

In 1980, during a study of the regional fishing industry, several fishermen conceded that their productivity could be increased but for the deficiencies in the existing marketing and distribution systems. The need for these facilities has been recognised by the governments of all the territories which have developed, or are in the process of developing, appropriate programmes.

National Programmes

St. Lucia -

The fishing industry in St. Lucia is characterized by the artisanal fisherman and all of the constraints which accompany the type of fishing. However, a comprehensive approach has been adopted to strengthening and developing the fisheries industry. The government of St. Lucia, through the Fisheries Management Unit (FMU) of the Ministry of Agriculture, Lands, Fisheries & Cooperatives has recently prepared a five-year development programme aimed at integrating the various facets of the industry.

The basic elements of the programme provide for the linking of production, processing, marketing and support facilities within the industry. The FMU will coordinate these linkages and will be assisted in implementing the coordinated fisheries plan by other organizations, such as the National Development Corporation (NDC) and the National Association of Fishermen's Cooperative Society (NAFCOOP).

The major physical components of this programme are:

- (1) A fish processing complex which is funded in part by CIDA will be run by a strengthened NAFCOOP. The processing plant has been designed with the following nominal maximum capacities:
 - (a) fish processing - 4545kg per day product
 - (b) fresh fish storage - 22725kg product
 - (c) frozen fish processing - 2270kg per day product
 - (d) cold storage capacity - 90,000kg product
 - (e) ice manufacturing - 4545 kg per 24 hours.
- (2) A cold storage and fish market facility to be operated by NAFCOOP.
- (3) Additional cold storage facilities with 120 tonnes capacity to be provided by the Government of St. Lucia which will serve as a catalyst to increase fish landings
- (4) Training, demonstrations, research, surveys and share facilities; and
- (5) Primary fishing cooperative societies.

A strong local market exists which can easily absorb an additional 775 tonnes of fish handled by this fish processing complex. The present level of landings is 1227 tonnes and is expected to be doubled in the next ten years as a result of this complex.

The latest information on this complex is that it is to be scaled down because of the lack of funds to meet the original proposals.

Dominica -

Fisheries continues to be artisanal in terms of equipment and technologies inspite of its relative importance as a source of food, employment and income.

The Government of Dominica has embarked on an integrated programme to develop the industry. In 1981 by an Act of Parliament, exclusive economic zones were established. Some discussions on the determination of off-shore boundaries and fisheries agreements with adjacent and other countries for fishing rights have been initiated.

Development plans include the introduction of new technology, together with the training of local fishermen to utilize new technological methods.

It is also proposed that improved infrastructure be provided for fisheries development. This includes the setting up and operation of selected fish reception centres around the island, linked with a central unit with ice making, cold storage and marketing (including some processing) facilities to be constructed and operated in the capital, Roseau. These facilities are considered a pre-requisite to increased production.

While artisanal fishing operations have been the mainstay of Dominica's fish production, the Government is giving encouragement to the use of larger boats for exploitation of fisheries.

Grenada -

The fisheries sector is characterized by a large artisanal fishing population using small boats and traditional fishing gear. Because of the significant shelf area which slopes gradually outward from the islands covering 1200 km² the conditions are favourable for productive fishing. The Government initiated plans for an artisanal fisheries development project as part of comprehensive fisheries management strategy.

The project consists of

upgrading six markets into fishery centres, erecting two new fish collection sheds and establishing two new fishing centres. In addition, a marketing distribution is to be set up and a credit facility is to be extended to fishermen, vendors and boat builders. These facilities are estimated to cost US\$2.9 million which is to be provided jointly by the International Fund for Agricultural Development (IFAD), the Venezuelan Investment Fund (VIF) and the Government of Grenada.

The Government also formed the National Fisheries Company in 1981 with the following objectives:

- (1) To catch and distribute additional supplies of fresh fish to the home market
- (2) To replace imports by manufacturing salted/dried, smoked and pickled fish; and
- (3) To export fish to the other Caricom and nearby countries.

The NFC was responsible for the fleet of ten Ferro-cement boats, a gift from Cuba and one fibreglass boat made in the USA that was acquired by the company. It was also responsible for the operation of a small processing plant where salted, dried shark and smoked flying fish and jacks were processed.

The company has been a failure due to various factors among them being a lack of proper management.

St. Vincent -

The fishing industry effort here is in need of more modern craft suitable for longer voyages and a wider range of modern fishing techniques in order to exploit the pelagic and demersal species along the crest and the soft bottom of the continental shelf.

Again the fishermen are handicapped in their activities by the lack of access to engine spare parts, supplies of fishing gears, ice, cold storage and an inadequate marketing system when catches are heavy.

There are no processing facilities; but the development of

cooperatives, which is being promoted by the Government in its fisheries management strategy will aid in the development of the artisanal fisheries.

Antigua -

The inshore fishing in Antigua provides employment for an estimated 450 full and part time fishermen. The productivity of the water around the island is low because of the low nutrient supply. The present fishery is almost exclusively based on bottom fishing of the shallow reefs. However, stocks of the seasonally migrating pelagic fishes are sufficiently available to permit commercial exploitation. Prolonged fishing pressure appears to have depleted the limited stocks in the shallow reefs in some areas and fishermen generally do not possess appropriate equipment and expertise to exploit the deep slopes.

The present annual demand for fish is estimated 2300 tonnes and the total annual catch is estimated at 1300 tonnes. It is estimated that imported cured and canned fish comprise 50 per cent of the fish consumed. On the basis of this the Government of Antigua and the Caribbean Food Corporation (CFC) with funding assistance from the CDB formed a limited liability company, Antigua Fisheries Limited, which recently became engaged in harvesting of fish and would soon be engaged in the processing of fish.²

It will trade in fish and fish products locally and eventually for export. The company has received four of a projected 12 boats that it would acquire over a three-year period for deep sea fishing.

The processing plant and other shore facilities such as a dock, boat yard, ice making, and storage and freezing and cold storage will be installed in 1984. The project is meant to complement the existing artisanal fisheries and assist in reducing the unemployment level, while at the same time improving the skills of those employed on the fishing industry.

estimated investment is US\$5.278 million with share capital of US\$511,000 (Government of Antigua - \$296,000; CFC - \$100,000), Loan US\$4.767 million (CDB to GOA to AFL) and Convertible Debentures from CFC (US\$100,000).

When fully operational the company would process 1378 tonnes of fish which will be harvested annually; which, added to the inshore artisanal fisheries will create 603 tonnes surplus to be exported.

The company is expected to employ 163 persons by the sixth year of operation of which 140 will be full time employees. Backward and forward linkages will also be created to other industries such as boat building, tourism and agriculture (fish silage for stock feed).

Fishing Operations - Each boat will be manned by a captain, a crew of four and a trainee. Boats will spend five days at sea per trip on the average, and will cycle through their unloading of fish and servicing operation on seven days. Each boat will be expected to average 44 trips per year.

The gear and equipment will consist of fish pots, trolling lines, long lines, and hydraulic reels for exploitation of the pelagic stocks during January to June and the demersal stock during the remainder of the year.

Boats - At the present time four fibreglass boats have been acquired and two wooden locally built boats are being manufactured. These will be evaluated to determine the type of the remaining six boats to be acquired.

Boat Yard - The boat yard is designed to accommodate four boats simultaneously and will include space for lifting, locating, repairing and launching boats.

Dock - Docking facilities will comprise berthing space and facilities for servicing and refuelling two boats simultaneously.

Plant/Office Complex - The plant will contain an ice making machine and storage bins, two blast freezers, three cold storage rooms and rooms for offices and workers.

The maximum throughput is 2000 tonnes of fish per year and processing will involve washing, sealing, gutting, deheading, trimming, filleting and steaking as required, freezing, glazing and packing. Annual production is not expected to exceed 1600 tons of fish.

Water Supply - Because Antigua suffers from an annual low rainfall and it is unlikely that the total daily water demand of 205,000 litres (45,000 gal.) could be met from existing fresh water supplies, it is proposed to use sea water for the first wash, processing and general clean-up; and fresh water for ice making, rinsing and staff use.

Provision is made for a sea water system with a capacity to pump; chlorinate and deliver 131 litres (30 gal.) per minute on a 24 hour basis; also a reserve osmosis system with the capacity to produce and store 55,000 litres (12,000 gal.) of water per day is suggested to supplement the local fresh water supply.

Efficient Disposal - Because of the high Biological Oxygen Demand (BOD), direct discharge of raw fish processing wastes into the sea would cause offensive odours and other pollution problems.

The primary treatment system for liquid effluent in the form of a five-celled cesspool which will effect sedimentation, filtration, and aeration prior to its discharge into the sea is provided.

Solid waste will be separated in-plant by a number of traps located along the flow drainage system.

Freezing and Cold Storage - The freezer plant is designed to freeze seven tonnes of fish per day and is capable of maintaining holding temperatures of between 26°C and

30°C.

Ice Machine and Ice Storage - The ice making machine will have a production capacity of 15 tonnes of flake ice per day and storage bins will have a 20 tonnes capacity. About two tonnes of ice is expected to be sold daily to artisanal fishermen with the rest being used by the boats and in the plant.

Because of delays in the implementation of the project, the original funding is inadequate for completion of the entire project. Consequently a phased approach was adopted. Phase I which is estimated to cost US\$3.444 million, is presently being implemented and allows for an early establishment of a low volume fish processing facility (2 tonnes/day) to handle the catch of six boats. This processing facility will be temporarily housed in a building which will be used in Phase II for storage and maintenance. After Phase I there will be a reassessment of the project so as to determine whether the implementation of Phase II should be undertaken. It is expected that Phase II will provide the minimum facility (9 tonnes/day) necessary to handle the projected fish catch from 12 boats. ◦
