

PN-APLH-796
71294

FISHERY DEVELOPMENT SUPPORT SERVICES

WORKING PAPER SERIES

**COMMERCIAL ALTERNATIVES FOR SMALL-SCALE FISHERIES
IN LATIN AMERICA**

FDSS Working Paper No. 24

**International Center for Marine Resource Development
The University of Rhode Island
126 Woodward Hall
Kingston, RI 02881-0804 USA**



TO REQUEST COPIES OF FDSS WORKING PAPERS WRITE TO:

**The Librarian
ICMRD Information Services
Main Library
The University of Rhode Island
Kingston, RI 02881-0804
USA**

**Support provided by the USAID Cooperative Agreement DAN 4042-A-00-7073
"Fishery Development Support Services" S&T/AGR/RNR.**

FDSS Working Paper No. 24

**COMMERCIAL ALTERNATIVES FOR SMALL-SCALE FISHERIES
IN LATIN AMERICA**

by

Michael T. Morrissey

**International Center For Marine Resource Development
The University of Rhode Island**

November 1988

COMMERCIAL ALTERNATIVES FOR SMALL-SCALE FISHERIES IN LATIN AMERICA

Introduction

Small-scale fishermen and their organizations often need financial assistance to initiate new capital ventures in either the expansion of fresh fish marketing or the development of fishery products. Thus, it is often necessary that their ventures fall within the larger framework of governmental ideals and goals for fishery development for the country. In this way, capital may become more available to them in terms of loans or grants. In a workshop held at The University of Rhode Island (Morrissey, 1988) that dealt with postharvest fishery technology a committee of international experts defined some of the goals for national fishery policies as:

1. Increasing incomes and employment within the fishing community.
2. Improving national nutrition.
3. Increasing foreign exchange earning.
4. Reducing inequities in the distribution of incomes and food supplies within the fishing community.

Programs within these objectives, as applied to the small-scale fishermen of Latin America, can be directed to expand the marketing of fish products and allow fishermen more versatility and access to capital than they have previously experienced. Traditionally, small-scale fishermen in Latin America have concentrated on the harvesting component of the fishery sector and have not played a large role in the commercialization of their capture. This is evident in the strong growth seen in many Latin American fisheries over the last two decades which also showed an increase in production in the small-scale fishery sector. However, we have also witnessed a growth in the number of fishermen and in some areas a decrease in the productivity or fish capture per individual.

Small-scale fisheries can be also adversely affected by market conditions especially if they exist solely as a production oriented operation. Much of the harvest is seasonal and runs of fish can flood the market and cause a depression in prices. If they are limited to a few buyers or regional markets, optimum marketing of the capture may be restricted. On the other hand, small-scale fisheries tend to

be a near shore activity, and many fisheries for highly valued species are currently being fished near their maximum potential. Consequently, the small-scale fishermen and their organizations should look more toward other sectors of the fisheries, such as marketing, as a means of development of their enterprise.

Integration With Official Policy

With regards to the first policy stated above, increasing incomes and employment within the fishing community, there is an implicit statement that the small-scale fishermen must be willing to diversify and seek other market opportunities. This has occurred in several countries. In Ecuador, there have been examples in the small-scale sectors of people with sufficient entrepreneurial skills to meet new demands in the marketplace. One such demand has occurred through shrimp aquaculture and has contributed to the enormous success of Ecuadorian shrimp in the present world market. Many smaller artisanal industries, from larvae fishermen to small companies that formulate diets, are integral to the shrimp aquaculture economy. Although this system is far from perfect both from a technological and social standpoint, it has provided numerous jobs in the fisheries sector. A different example in Ecuador is the utilization of fish wastes such as eviscera from the larger species of fish. The eviscera is produced into a low grade fish meal for local use. Although this operation is a minor one it has helped increase the employment and the incomes of certain segments within the fishing communities.

The improvement of national nutrition through increased fishery production and distribution requires a concerted effort between the fishermen, middlemen and the government. Most often the targeted population for such projects is the lower income segment of the population that have low amounts of animal protein in their diet. This is due not only to economic factors but sociocultural factors as well. More often than not in Latin America, these people reside in the non-coastal regions, mainly in mountainous areas where transportation difficulties can hinder the distribution of a highly perishable product such as fish. Preservation, processing and transportation of fish incur costs that can make this commodity food item out of the reach of lower income groups. Lack of tradition of eating fish based products makes it difficult to introduce new inexpensive products, even those that have minimal storage requirements. It is for this reason, that if a strategic goal for a nation is to improve the nutrition of the nation, a subsidized distribution/marketing program has to have the help of an external funding source to increase its chances for success. There have been very few successful programs along these lines

and only those that are well integrated with technology, sociology, and nutrition disciplines have a chance for success.

In the mid 1970's in Mexico, a significant program in the commercialization of the increased fisheries production was initiated. It incorporated the establishment of numerous new retail centers and large distribution centers. The main idea was to stabilize prices and introduce fish into new market areas. Within two years the majority of the centers had closed down and disappeared. Some of the problems included inconsistent supply, poor planning of the location of the centers, poor incentives of the workers and lack of good marketing studies to know what types of products would be the most acceptable (Morrissey, 1988). Increasing domestic markets in developing countries is a difficult proposition especially if the product is a high priced commodity such as fish. The development of inexpensive products from underutilized species is a partial answer but the targeted consumer groups within the country need to be sold on the products if they are to be used.

With regards to increasing foreign exchange earnings, a certain reality has to be faced. Industries such as shrimp fisheries or aquaculture are able to generate foreign investment, and because governments have an interest to generate exports that are a result of aquaculture, there is strong support for this type of activity. There do exist international markets for several of the species of fish that are regularly caught in Latin American waters, and there is the opportunity for well-organized cooperatives that fish certain species to export some of their catch overseas. For example, in the Quintana Roo province of Mexico which faces the Caribbean as well as the Gulf of Mexico, there is a great potential to increase finfish exports (snapper, grouper, etc.) to the U.S. (Barnett, 1987). This potential exists in several Central American countries as well.

The demand for fish as a food commodity has increased significantly throughout the world and will continue to do so. In the U.S. this has occurred because of publicity concerning the attractiveness of fish as a food and recent studies demonstrating the nutritional benefits of fish. This has led to a great demand for highly valued white fish such as red snapper and grouper and some species of fish that were rejected as seafood as little as a decade ago. To what extent small-scale fishermen and their organizations will be able to take advantage of these new markets will remain to be seen. Furthermore, international market development should cause disruptions in supply or inflationary prices in the domestic market.

The reduction of inequities of income distribution within the fishing community is an ideal that can be best served through development of fishermen's organizations such as cooperatives. This is especially true if we are looking at mechanisms for export, or alternative processing of fish with the idea of opening new markets both domestic and foreign. It is difficult for small groups of artisanal fishermen to develop the financial resources to take on new technology or processing techniques. The risk involved can be substantial and is better met with a group input such as cooperatives. Often, working capital in the form of loans or development grants are more readily available to fishermen organizations than to individuals (Pollnac 1985). Unfortunately, the success rate of Latin American fishing cooperatives has not been high over the last two decades. There are many reasons for this which are beyond the scope of this paper. However, many of the cooperatives that are functioning today have several years of experience in the harvesting of fish and are relatively stable. A new growth area that should be open to them is the marketing of their product. This will allow the vertical integration of cooperatives and expansion of their activities.

Development of New Markets

What are the driving forces behind the opening of new markets and what chance of being economically viable for the small-scale fisherman of this region? These questions are addressed in two parts: the first examines present markets to see if within the framework of domestic and international selling and buying, there are ready made mechanisms for expanding the role of the artisanal fishermen within a short period of time. The second part highlights areas where technology is developing with regard to future markets and where the small-scale fisherman can benefit if he, his organizations and his government are willing to make a concerted effort.

1. Domestic Markets

The large percentage of fish that is sold and consumed in Latin America is fresh fish. Many countries in Latin America are fortunate in having very rich fishing grounds off their coast that have for the most part not been over-exploited. In the theoretical sense, fish that is captured on the coast and is properly handled on board and on shore will have a good chance of reaching the main markets in excellent quality. In general, this does not occur in Latin America. Fish arrive at the market in average to poor quality, as there is not enough market pressure on the fishermen or the middlemen to use common practices such as evisceration and washing, or the use

of ice throughout the distribution chain. It is interesting to note that in Latin America, although quality is not high, there are minimal postharvest fishery losses in terms of fish being disposed of as unfit for human consumption. One can assume, therefore, that the demand exists for fish in the family diet. In Latin America, there is a positive perception of seafood in the diet. The main negative points are the price and the quality of the seafood. Consequently, good handling practices should be used with more frequency to present the consumer with a better product and chances are that the fish consumption will increase. However price is a major concern and an increase in quality should not significantly increase the price or the fish product could reach a cost level beyond the buying power of the average consumer.

The marketing of fresh fish and fishery products in Latin America can be expanded domestically and the quality improved dramatically without adding on excessive costs. What is needed is an integrated effort between fishery technologists, food scientists, sociologists and economists. The technology is there to improve quality. What should be studied is whether the driving forces are present for the small-scale fishermen and the middlemen to use the appropriate technology in the distribution system. A valid question would be to ask ourselves if fish are being consumed and little is wasted, what are the benefits of improving the quality. The most obvious benefit is the expansion of domestic markets. Several studies have shown that when good quality products are presented to the consumer there is an increased purchasing of the product by both traditional and new consumers. Ideally, a general program to increase quality should correspond with a government publicity campaign stressing the health benefits of fish consumption. If an education/promotion campaign for fishery products does not coincide with an improved quality program, the net result could be negative and a general distrust of fishery products can develop and would be hard to erase. An example of this is the general distrust that the Mexican consumer has for fishery products developed from Productos Pesqueros Mexicanos (Morrissey, 1985). A frozen, breaded fish product developed from the mince of several species of fish in the shrimp by-catch was promoted for the Mexican consumer. Problems developed in the production of the product as quality control was not strictly enforced allowing the product to be variable in its inherent organoleptic characteristics. The inconsistency in product quality created an initial lack of acceptance to the product. Although these past problems have been overcome, there is a skepticism that still exists that will hinder the re-introduction of the product in the marketplace. Therefore, good quality is an essential component when we are promoting fishery products and expanding domestic markets.

Several factors that should be taken into consideration in developing market strategies for Fishermen's organizations are:

- a) what are the reasons that people buy fish in the country
- b) what are the current prices and distribution structure
- c) how do variables such as size, species, quality influence price
- d) how are fish presented
- e) what are the fishery products that have good sales
- f) how is the buying population divided (e.g. income level, geographic area, eating habits).

Some of this information already exists in the government offices of fisheries. Furthermore, several organizations such as FAO have published numerous working papers and manuals that would help a small-scale business get started (Nautilus Consultants, 1987). However the best information is obtained by studying what is going on at the present time. As mentioned previously, the marketing of fish and fishery products has demonstrated phenomenal growth. With this growth there have been changes in the marketplace as well. What the norm was five years ago may be completely changed at present and needs to be updated. Good marketing information and reference sources exist and should be made available to the fishermen through their cooperatives or field extension agents.

2. Foreign Markets

The question of expansion to foreign markets is a policy decision that should coincide with the basic governmental attitude toward exports of agricultural and fishery products. Furthermore, there are many pitfalls in international trade, and the advantages and the disadvantages need to be considered.

Advantages

1. Potential for receiving foreign capital.
2. A means to improve infrastructure and quality.
3. Expansion of markets and species of fish captured.
4. Availability of foreign expertise.

Disadvantages

1. Unfamiliarity of markets and regulations of other countries.
2. Dependency on buyers that small-scale fishermen or cooperatives would have little control over.
3. Capital investment.
4. Possibility of overexploitation of certain species.
5. The best of the capture being sent to foreign markets while poorer quality is left for domestic markets.
6. Unpredictable fluctuation in world market prices.

When we look at foreign markets as a means to gain income for small-scale fishermen, we need to take these factors into consideration and decide what is the best policy. There is a strong market for fish and fishery products in the United States as well as Japan and Europe. Table 1 describes the exports from the major countries into the U.S. in 1986. For the Latin American region, exportation to the United States appears the most logical but with the Euro-dollar and Japanese yen at high levels, fishery products should be sold to the highest bidder and one that incurs the least risk for fishermen's cooperative. For example, if a cooperative can sell corvina from Costa Rica to a Miami based distributor for \$2.00 per kilo but must pay for transportation costs, insurance costs and run the risk of having his product rejected by federal inspectors in the United States, they may be better off by selling to a Japanese firm for less money (\$1.50 per kilo) and having the Japanese company take on the transportation and risk of importing to Japan. There may be less risk involved in the latter but the Japanese standards can be so demanding that additional start up costs may be high.

Private companies in several Latin American countries are exporting fresh fish to the United States. Air transportation to Miami is less than five hours from Central America and northern South America and the demand for fish is high. Therefore, the potential exists for cooperatives to run such a program themselves. Assistance from the Ministry of Fisheries of the exporting can be instrumental in the initiation of such a program whereby technical assistance and training of

Table 1. Partial List Exports of Fish Products in Metric Tons to the U.S.

Country	1986		
	Whole Fish Fresh	Whole Fish Frozen	Fillets Fresh & Frozen
Argentina	--	3016	9474
Uruguay	--	1163	6740
Peru	--	618	1701
Mexico	4415	410	--
Brazil	--	250	1540
Costa Rica	2673	--	--
Venezuela	1900	--	--
Ecuador	1300	--	--
Chile	524	--	4448

source: Sea Fare Expositions Inc., Seattle, WA

inspectors and fish handlers would be required. The government of Chile has encouraged the development of its seafood industry and especially its exports. Chile is currently becoming a major exporter of aquaculture salmon and other seafood. Its success and superior quality product has given Chilean seafood a marketing potential for other products as well. This is evident at major seafood shows around the U.S. as several Chilean companies sponsor booths and display several types of fish harvested in their waters.

There is no question that a marketing economist or someone familiar with the marketing and distribution of fish and fishery products on an international level is necessary to act as an advisor on a program such as this. For many Latin American fisheries, improvements in quality control are necessary for such an operation. These improvements in quality control should entail educational programs and workshops. Much that is quality control are simple procedures not requiring sophisticated equipment but rather common sense practices and lots of ice. With a highly perishable commodity such as fish the key words are time and temperature. The quicker the fish can be distributed, domestically or internationally, and the lower the temperature (ideally below 4 C) the longer shelf life the fish will have. We can see from the work of Bostock et al. (1985) the importance of quality control in the exportation of mahi-mahi to the United States from Ecuador. He reports that an "Import Alert" was placed on the importation of mahi-mahi from Ecuador due to the outbreak of scromboid fish poisoning and high levels of

histamine found in fillets of mahi-mahi. Due to these detentions, fewer importers were willing to take a risk on Ecuadorian mahi-mahi and the export value fell from over US\$ 1 million in 1979 to less than US\$ 43,000 in 1984. Histamine is a chemical compound produced by the action of bacterial enzymes. The growth of the bacteria and subsequent enzymatic action are rapid at ambient temperatures (25 - 30 C) within the first twenty-four hours after capture. It is essential, therefore, that the fisherman and his cooperative understand the basic principles of fish handling and that there are periodic checks to be sure that all the fish meet the quality standards of the importing country.

At present, the small-scale fishermen have only indirectly benefited from seafood entrepreneurship. They do not have the means nor the resources to do sophisticated market studies nor publicity campaigns to open new markets. Their increased opportunities are often found in supplying labor for a new need, one that has been created by a large governmental or industry promotional campaign or due to international market demands. There are examples of this in both the fresh fish distribution and processing of frozen products. In Ecuador a specialized system of work distribution has developed in the first stage processing of large commercial fish that are marked for exportation. There are the fishermen who bring in the large fish such as marlin and sharks, the carriers who transport the fish to the beach, the gutters who eviscerate and de-head the fish and wash them in the ocean and finally the transporters who truck the carcasses to the processing plants or wholesale centers. Included in this line of processing are young boys who take the eviscera and pile it on the beach to facilitate the removal of the waste which is usually processed into fishmeal. Within forty yards of beach there exist five distinct groups of workers all performing tasks that are important to the final goal of exporting marlin or mako shark fresh to the U.S. In Peru, the small-scale fishermen have to be flexible in utilizing the natural resources as well as determining the markets. With the occurrence of the 1982-83 El Nino which was disastrous for the industrialized fisheries, there was increased activity in the south central area in inshore scallop fishery that rapidly grew into several aquaculture ventures. Due to a stabilization of the normal water temperatures and also to overfishing of the scallop seed banks, the fishery collapsed by 1986. At present there is an increase in the fishing of small abalone and limpets which have export value for the Japanese market. Although the small-scale fisherman benefited from these market demands in the short run, the lack of continuity would have caused significant disruptions in their life styles for them and their families. In Ecuador and Chile the increased aquaculture activity (shrimp and salmon) has

increased local demand for underutilized species of fish for fish feed formulation.

Small-Scale Fish Processing

Fish processing allows us to take a highly perishable food commodity such as seafood and transform it into a desirable processed product that will be nutritious, have an extended shelf-life, and be of reasonable cost to the consumer. In general we can classify processed fish products into these categories:

Smoked Products

Salted/Dried Products

Canned Products

Frozen Fillets

Minced Products

Breaded Products

Traditionally Processed Products

Not all of these processes are applicable to Latin America at this time as much of the consumption of seafood is dictated by traditional customs. Many countries have had seafood development programs many of which have not been successful. Mexico's attempts to use the shrimp by-catch for minced products have not been successful in the last decade. Smoked fish, in general, has not found the acceptance in Latin America that it has elsewhere in the world in both developed and developing countries. In many countries it is consumed in coastal areas where acceptance of fishery products is much higher than in the interior. Ironically, higher priced smoked products such as smoked salmon are readily accepted by the wealthier classes while smoked domestic species such as mackerel or shark find little acceptance across all economic classes (Barratt et al., 1986). This is unfortunate in light of the extended shelf life, with or without refrigeration, that smoked products will give to a product. Its high protein content makes it an ideal food for many communities that consume less than optimal amounts of animal protein. Customs and traditional eating habits have not included smoked seafood products into the diets of the rural poor and it is difficult to introduce them. Smoked products of the more expensive fish (mahi-mahi, tuna) would command a higher price and could be directed to the more expensive domestic markets as well as for export. Less expensive smoked products could be developed

from mackerel and mullet and could be targeted toward populations of lower incomes. However a strong publicity campaign would be necessary to develop such an internal market.

Much of the same can be said for salted/dried products. In Ecuador and several Latin American countries, these products are specialty items that are consumed at certain times of the year such as Lent (Bostock et al., 1985). However, the sale is limited throughout the rest of the year. Again, a strong government publicity campaign would be necessary to allow for the expansion of the domestic markets. For the most part, publicity campaigns have been poorly planned and funded. This is regrettable as the end result of any successful applied seafood technology research should be the incorporation of the product into the marketplace. For the most part, this has not occurred in Latin America. The reasons for this are complex and would include the following:

1. There have been very few scientific studies on the dietary consumption patterns of the majority of countries in Latin America.
2. Preferences and attitudes toward fishery products is largely unknown.
3. The quality is variable, the presentation often poor and the sanitation inadequate in many of the seafood markets.

To a large degree, we have a situation of seafood technologists developing products without a good understanding of what the market will accept. This is frustrating to the technologists and grossly inefficient for fishery development programs as well. A better integration of technologists, sociologists and marketing economists is necessary to assure that fishery products are accepted and can be purchased by the targeted population.

Canned fishery products are important to many Latin American countries. In the Eastern Pacific Region from Mexico to Chile there are important pelagic fisheries in which canned products are produced. The majority of the small pelagics are reduced to fish meal which can earn foreign income through exports but diverts the fish away from human consumption. The majority of these fisheries are highly industrialized using purse seiners of 50 tons or more, and the processing of canned fishery products is an expensive enterprise in Latin America due to the cost of the equipment and the canning material. It would be difficult to venture into this enterprise on the small-scale but there are alternatives. Because of the high demand of fishery products there is an interest in different presentations of the fatty fish such as sardine and mackerel.

Countries such as Mexico are presently undertaking a pilot program exploring marketing of sardines that have been dipped in a solution of anti-oxidants, frozen and then packaged in sealed plastic. The capital investment for such a program would be considerably less than a canning operation. However, it is not clear at this time whether a significant market exists for the products as yet.

Frozen Products

Frozen fish products include frozen fillets, breaded products and minced blocks. The advantage of frozen products is the long shelf-life that the products enjoy under proper storage conditions. The disadvantages include the cost and maintenance of equipment as well as the possibility of producing an inferior product due to poor freezing methods or improper packaging. Frozen fish commands a lower price on the marketplace than fresh fish of the same species. However, recent advances in freezing and packaging technology plus the international demand of fish products have opened new markets for frozen fish products.

The most simple frozen products are frozen fillets of fish. The export of frozen fish fillets to the U.S. has increased significantly over the last several years. Several private companies and cooperatives that have been exporting frozen shrimp have begun to diversify into sales of frozen fish. This is important, especially in regions where the capture of shrimp is a seasonal activity. Processing of frozen fish allows the fisherman to extend his season and income generating potential. As in fresh fish, the greatest drawback to an expansion of the marketplace is in the quality of the product. Often the product is processed and frozen properly, but the packaging is of such poor quality that defects such as freezer burn, humidity loss or lipid oxidation deter consumer acceptance of the product. Better training in processing technology is necessary for the processor to understand that for a good quality product more than just the freezing of the fillet is necessary.

Frozen minced fish blocks are also an option for nations wishing to expand their marketing potential. Essentially, this product is the flesh of the fish recovered by the use of a deboner which removes the skin and the bones. Normally, the fish is first de-headed and gutted before being processed through the machine. The minced product is then frozen so that it may be processed at a later date or exported for foreign capital earnings. Fish minces can also be further processed by additional washings and the mixing of cryoprotectants (normally salt, phosphates and sugars that protect the integrity of the texture of the frozen fish block

during storage). These blocks are then used for the production of surimi, a product that can have texture properties similar to shellfish. Along with the increase in demand for fresh fish there has been an increase in demand for frozen mince blocks and a gradual increase in price over the last several years. Eartullo (1986) described efforts to diversify the fish products in Uruguay. They have begun a program in the production of frozen fish mince blocks for both export purposes and for the development of products for domestic consumption. The economics of starting such a program in Latin America show that there must exist (1) a sustainable supply of fish that allows the processors to run a year round operation, and (2) a sustainable demand for the product that will allow processors to show a continual profit (Regier and Raizin, 1987).

In several countries the potential supply of fish could come from underutilized species in the current wild stock, shrimp by-catch and fish frames from a fillet operation. An economic survey should first be run to demonstrate the availability of this supply and the cost of bringing it into the processor. The present low consumption of fishery products in Latin America would mean that initially most of the mince production would go for export where the demand exists. It would then be the responsibility of the government in conjunction with the industry to establish a domestic market through a propaganda campaign that would hopefully increase fish consumption in the country. Many low cost items could be developed from fish minces, however, most of these products require refrigeration which might not be readily available in the more remote areas of the country. There is a rising controversy over the development of surimi type products in developing countries. The focus of the controversy is that capital resources for fishery development may be diverted to develop surimi-based export products rather than be used on domestic needs. Furthermore, in the processing of washed minces such as surimi, many of the nutrients such as the soluble proteins and the lipids are purposely washed away. Several fishery technologists who are working in developing countries feel that this could be considered a postharvest loss since the net return of edible seafood is diminished in the process. Concern should be taken regarding this issue and certainly white fish that is utilized as fillets or breaded products should not be targeted for surimi based products. In Uruguay the targeted species is the hake which does not have a high demand in the domestic market and is an underutilized resource that can be exploited. These issues need to be addressed and policy decisions should be based on sound socio-economic data as well as biological assessment of stocks.

Value-added products present another opportunity that fishermen's organizations as well as small-scale processing industries need to explore to increase their earnings. Value-added products is a term used for a processed product that naturally has a higher price than the raw material. If frozen fish blocks are being sold to a domestic or foreign company who then manufactures a breaded frozen product, then this breaded product is a value-added product and will under most circumstances command a higher price. The main constraints to local small-scale processors producing value-added products is the lack of infrastructure and requirements for capital investment. Several multinational loan programs have focused on construction of processing plant infrastructure in the past and capital could conceivably come from these sources in the future as well. Some of the products include: shark burgers, sardine in tomato paste, tuna in Spanish sauce, breaded and battered squid rings, breaded frozen fillets, etc. As in all other processed fish products, one can only produce a product as good as the raw material. Quality control must be insisted on from the receiving of the raw material to the final product evaluation. Inconsistency with regard to product quality is a problem for any processed product and must be solved before the expansion of markets, both domestic and foreign, can take place.

Non-traditional Alternatives

Because of the increasing demand on many forms of seafood products there are new opportunities opening for the small-scale entrepreneur in the fishery sector. As a result of the shrimp aquaculture industry, there has been an increased need in the formulation of diets for the growing shrimp. Many diets can be made locally from shrimp wastes or underutilized species of fish and can supply small aquaculture ventures. Chitin, obtained from the shell wastes of shrimp and other crustaceans, is being used in the pharmaceutical industry and is thought of as a potential additive component in the food industry as well. The exportation of shark fins to the Orient has been an established industry for years as well as the utilization of shark skin for leather materials. The oriental market has an increased demand for many specialty items such as fish bladders, which are exported to Miami from Ecuador and Peru and supply the oriental restaurant trade. Limpets are a shell fish not consumed in Latin America but with a high demand in Japan. The same is true for sea urchins. In Ecuador there is an active industry in the utilization of fish wastes in the small-scale fisheries sector (Belisle et al., 1987). Eviscera and small non-utilized fish are dried in the sun and ground up for fish meal. Although the quality of the fish meal produced in the pampas may be extremely low it is a good example of the potential use of

waste products that had little or no economic value several years ago. The shrimp by-catch is used to varying degrees throughout Latin America. There has been a concerted effort in the late 70's and early 80's in several Latin American countries, much of which failed due to economic reasons. In Ecuador a system has evolved naturally without any government support programs. The by-catch is brought in on a daily basis from large shrimp vessels that fish off the coast. This process, which involves launches that travel 20 kilometers or more to meet the larger shrimp vessels at prearranged locations, assures that the daily by-catch will be brought in relatively fresh. Similar systems could be initiated in other Latin American countries depending on market demand, by-catch composition and willingness on the part of small-scale and shrimp fishermen.

Summary

The demand for fresh fish and fish products is at an all-time high and there are opportunities for the small-scale fishermen that didn't exist a decade ago. To take advantage of these opportunities it is necessary that the fishermen and the small entrepreneur be willing to adapt to certain needs and incorporate certain technologies that go hand in hand with these opportunities. These technologies need not be overly sophisticated and most often deal with common sense practices that improve quality and sanitation. If a decision is made on a national level to further incorporate the small-scale fishermen in Latin America into the mainstream of national and world fisheries markets there are several steps that the governments must take. The first and most important is that a strong extension service to the small-scale fisherman must be established. Quality control and the use of appropriate fishery technology must be taught at the beach level, where the impact will be the greatest. If this is not done there will be less of a chance for the small-scale fisherman to expand his base and adapt to market changes. These changes will occur because they will be driven by economic factors that demand more high quality fishery products. Finally, capable fishery officers who can act as liaisons between small-scale fishermen, the cooperatives and private industry, and who understand the workings of the domestic and international market need to take a larger role in fisheries development projects within the country itself.

REFERENCES

Barnett, J.
1987. Promise of the Yucatan. Seafood Business 6(4):28.

- Barratt, A. J. Coulter and N. Camba.
1986. Produccion y mercado de pescado ahumado. Una guia para productores. Boletin Cientifico y Tecnico VIII (9). Instituto Nacional de Pesca, Guayaquil, Ecuador.
- Belisle, J. F., M. Cuvi and M. Prieto.
1988. Uses of fish waste from the artisanal fishery of Ecuador. In: Postharvest Fishery Losses, M.T. Morrissey (ed.). ICMRD, The University of Rhode Island, Kingston, RI.
- Bertullo, E.
1986. Minced fish and its potential contribution to industrial diversification in Uruguay. INFOFISH Marketing Digest No. 3:16.
- Bostock, T., A. Barrat and N. Camba.
1985. Un estudio de histamina en Dorado (MAHI-MAHI Coryphaena hippurus) y su relacion con la calidad de producto de la pesca ecuatoriana. Boletin Cientifica y Tecnico VIII (2). Instituto Nacional de Pesca, Guayaquil, Ecuador.
- Bostock, T., J. Coulter and R. Mosquera.
1985. The use of solar dryers in the production of high quality and dried fish: guide for producers and profile of economic feasibility. Boletin Cientifica y Tecnico VII (10). Instituto Nacional de Pesca, Guayaquil, Ecuador.
- Morrissey, M. T.
1985. Utilization of the shrimp by-catch for human foods. In: Recursos Pesqueros Potenciales de Mexico: La Pesca Acompañante del Camaron. A. Yanez- Arancibia (ed.). UNAM Press, Mexico City, Mexico
- Morrissey, M.T. (ed.)
1988. Postharvest Fishery Losses. Proceedings of an International Workshop held at The University of Rhode Island. ICMRD, The University of Rhode Island, Kingston, RI.
- Morrissey, M.T.
1988. Report to Inter-American Development Bank regarding Mexican fisheries loan 265/OC-ME.
- Pollnac, R.B.
1985. Social and cultural characteristics in small-scale fishery development. In: Putting People First: Sociological Variables In Rural Development. M. Cernea (ed.) Oxford University Press, New York, NY.

Nautilus Consultants, LTD.

1987. Manual For The Management Of Small Fishery Enterprises. FAO, Rome, Italy.

Regier, L.W. and M.A. Raizin.

1987. Fish mince: its potential for less developed countries and others. In: Postharvest Fishery Losses, W. T. Morrissey (ed.). ICMRD, The University of Rhode Island, Kingston RI.

Sea Fare Expositions, Inc.

1987. Sea Fare Seafood Seminar: A Buyer's Guide To Latin American Seafood. Seafood Leader Magazine, Seattle, WA.

TO REQUEST ASSISTANCE

To request assistance or obtain more information about Fishery Development Support Services (DAN 4024-A-00 7073) ask your AID country mission or write to:

Dr. Donald E. McCreight
Program Director, FDSS
International Center for Marine Resource Development
University of Rhode Island
126 Woodward Hall
Kingston, RI 02881
Tel: (401) 792-2479

Dr. Spiros Constantinides
Deputy Director
International Center for Marine Resource Development
University of Rhode Island
126 Woodward Hall
Kingston, RI 02881
Tel: (401) 792-2133

Mr. George Aelion
Assistant Director, Operations and Training
International Center for Marine Resource Development
University of Rhode Island
126 Woodward Hall
Kingston, RI 02881
Tel: (401) 792-2479

Dr. Richard Neal
Program Officer, S&T/AGR/RNR
Office of Agriculture
Agency for International Development
Washington, DC 20523
Tel: (703) 875-4027

Dr. Lamarr Trott
Project Monitor, FDSS
S&T/AGR/RNR
Agency for International Development
Washington, DC 20523
Tel: (703) 875-4098

Fishery Development Support Services (FDSS) is a program of the United States Agency for International Development (USAID), implemented by the International Center for Marine Resource Development (ICMRD) of The University of Rhode Island (URI) with collaborative support from the Bureau of Science and Technology of USAID. FDSS provides to developing countries fisheries technical assistance, information services and training programs as well as applied research in fisheries development in the following areas: sociocultural factors, postharvest technology, resource utilization, management and mariculture.