AGENCY FOR INTERNATIONAL DEVELOPMENT

PPC/CDIE/DI REPORT PROCESSING FORM

PN-ABG-371

ENTER INFORMATION ONLY IF NOT INCLUDED ON COVER OR TITLE PAGE OF DOCUMENT

Project/Subproject Number	2. Contract/Grant Number	3. Publication Date
596-0108-3-60011	596-0108-C-00-6060-00	APR.25-MAY11,'87

4. Document Title/Translated Title

INITIAL SURVEY OF THE SHRIMP AND HIGH VALUE SEAFOODS INDUSTRY IN GUATEMALA, EL SALVADOR AND HONDURAS.

5. Author(s)

1. PAUL D. MAUGLE
2.
3.

6. Contributing Organization(s)

7. Pagination	8. Report Number	9. Sponsoring A.I.D. Office
15	ST/87-32	ROCAP

10. Abstract (optional - 250 word limit)

11. Subject Keywords (optional)

1. SHRIMP INDUSTRY
2. SEAFOODS INDUSTRY
3. GUATEMALA
4. EL SALVADOR,
5. HONDURAS
6.

12. Supplementary Notes

13. Submitting Official	14. Telephone Number	15. Today's Date
DIANE BEJARANO	202/466-5340	JULY 5, 1990

DO NOT write below this line

16. DOCID	17. Document Disposition
	DOCRD [ ] INV [ ] DUPLICATE [ ]

AID 590-7 (10/88)

CHEMONICS

PN ABG-371
TSN 628217

PROEXAG

NON-TRADITIONAL AGRICULTURAL EXPORT SUPPORT PROJECT

INITIAL SURVEY OF THE SHRIMP AND HIGH VALUE SEAFOODS INDUSTRY IN GUATEMALA, EL SALVADOR AND HONDURAS

Assignment Number 87-32

Contract Number: 596-0108-C-00-6060-00

SUBMITTED TO:
Regional Office for Central America and Panama (ROCAP)
U.S. Agency for International Development
Guatemala City, Guatemala

SUBMITTED BY:

Paul D. Maugle

through

Chemonics International Consulting Division
2000 M Street, Northwest
Suite 200
Washington, D.C. 20036

April 25 - May 11, 1987

SECTION I

INTRODUCTION

In April of 1987, I was contracted by Chemonics International Consulting Division as aquaculture specialist under the USAID/ROCAP-financed Non-Traditional Agricultural Export Support Project in Central America (PROEXAG).

The objectives of this short-term TDY were to:

1) assist the producers of shrimp and high-value aquatic foods to resolve immediate problems in production and processing

2) assist Chemonics to define which issues it should focus on in future activities

SECTION II

DEVELOPING A MINI-STRATEGY FOR HIGH-VALUE SEAFOOD PRODUCTS IN GUATEMALA

The TDY began in Guatemala City, Monday, April 27, with a meeting sponsored by Chemonics and its counterpart, the Gremial de Exportadores de Productos no Tradicionales, attended by 15 fish and shrimp producers, fresh fish processors and exporters. The group voiced concern over problems in the following areas: trout production and nutrition; macrobrachium production; penaeid shrimp production and nutrition; tilapia production; fresh fish exports; long line fishing techniques, training, processing and shipping; shark processing; catfish production; and oyster production. The Gremial arranged follow-up meetings with individuals who expressed interest in technical assistance and advice on future development plans.

A similar meeting was sponsored by the Gremial office in Quezaltenango on Thursday, April 30, attended by 20 persons. At this meeting future producers expressed interest in trout, carp, exotic fish and shrimp. Several persons wanted to integrate fish production and ongoing agricultural enterprises. Follow-up meetings and technical assessments were provided to several potential producers.

The so-called mini-strategy for developing the shrimp and high-value seafood industry in Guatemala is based on these meetings and my technical assessment of ongoing operations. Where possible, interviews are presented and verified by rudimentary data.

A. Background and Potential

In 1986, high-value seafood products in Guatemala accounted for less than 2 percent of agricultural income, estimated at 2 billion U.S.D. The shrimp trawler industry, which traditionally dominated high-value seafood income, is facing imminent collapse.

Estimated Shrimp Trawler Production

YEAR	Lbs./ Yr.	Estd. Value ($ Million)
1984	5,000,000	20
1985	3,500,000	14
1986	3,000,000	12

Overfishing, theft, and insecticide residue from chemically intensive agricultural production seem to have contributed to a reduction in catches, accounting for presently less profitable levels.

Guatemala is nonetheless evolving into a reasonably efficient shrimp supplier with a growing shrimp farming sector. Ocean shrimpers operating on the Pacific coast produce approximately 79.1 percent of current volume. The potential for production expansion lies in commercial shrimp farming. Shrimp production in Guatemala began in 1983, and has grown rapidly to approximately 936 hectares of production area, accounting for approximately $ 2.5 million in foreign exchange earnings in 1986. Eminent shrimp producers estimate that the potential exists to expand to 5,000 hectares, with annual earnings of $ 26 - 31 million.

Estimated Shrimp Pond Production

Management Type	Area (Ha)	Seed Required*	Production (Lbs/Ha)**
Extensive	350	15-25	500
Semi-Extensive	250	40	850
Semi-Intensive	336	50-70	1,000

* Estimated stocking density given in 1,000 post larvae per hectare. Ranges indicate seasonal variation.

** Size and value depend on stocking strategy, season and climatic variation.

Guatemala has other high-value seafood species, primarily table fish, that it is just now beginning to export, and thus it has a seemingly great potential for expansion. A premium market exists in the U.S. for red snapper, which is currently supplied by Venezuela, Mexico, Costa Rica, and Panama. The FAO estimated in 1984 that Guatemala has the potential to yield 3 million pounds or approximately $6.6 million of snapper annually. Guatemala currently exports between 5,000 and 8,000 pounds at a value of $15,000 weekly and appears to have the potential for a twelve-fold expansion. With improvements in the expanding fresh snapper and grouper infrastructure, Guatemala could take advantage of its efficient transportation links and expand its exports.

The "langostino" or deep sea shrimp nephrops also appears to have great potential. Present plans to utilize this product as a

meal for animal feeds should be expanded to include extraction of its high-quality oil for human nutritional and medical purposes.

Trout farming efforts are currently producing between 50 and 100 pounds per week for local consumption. Guatemala has extraordinary quantities of high-quality, cold (60-65° F) water. The potential exists to expand greatly the production and marketing of trout products. Several potential producers are looking at a window market for fresh trout during the winter months in Miami, Puerto Rico, and other Caribbean areas. The potential for export of smoked trout and salmon products should be assessed, as it would provide continuous entry to high-value markets in the U.S., Europe and Asia.

The production of native species for export as exotic aquarium fish has yet to be developed. Currently aquarium fish are imported. Warm water finfish production efforts are currently focused on tilapia and carp. Netpen production of these species is being commercially developed on a small scale. Earlier introductions of bass have had a deleterious effect on native populations of fish and have not been successful in providing protein to indigenous populations.

The U.S. pet industry currently exceeds $ 1 billion annually. Freshwater aquarium fish account for 10-15 percent of annual sales. The potential for production of "native-exotic" species should be closely assessed. A survey of marketable native species with culture potential should be undertaken. Methods exist for the culture of many species currently marketed in the U.S. aquarium industry. Efforts to cultivate native species with strong market potential should be encouraged.

B. Constraints

Good management of shrimp stocks is critical if Guatemala is to avoid continued sharp declines in its yields. It is believed that Guatemala may be depleting its shrimp resource through overfishing by too many boats and the continued use of insecticides in chemically intensive agriculture. Currently a closed season has been implemented, and such efforts should be continued.

Resources and infrastructure currently supporting the marine shrimp fishery should be gradually modified to support the increasingly valuable long-line finfish and langostino fisheries.

The interrelationships among development initiatives such as chemically intensive agriculture, municipal and mining wastes and their impacts must be more clearly defined. Shrimp production in ponds and from boats requires "clean" feeds and water and healthy

post larvae. Long-term exposure (30 days) to DDT at 1.5 PPB has been shown to enhance the virulence of viral infection Baculovirus ptaraei in Penaeus vannamei, the species of preference. Intensive agricultural production such as that used for cotton and other agricultural products could result in high levels of residual insecticides and other toxins in feed stuffs and runoff waters. This situation would contribute to an increased incidence of disease, unexplained die-offs, and lower quality in this high-value export product.

Guatemala currently lacks adequate infrastructure to handle the export of iced fish effectively. This, coupled with a lack of information on specie-specific supply dynamics, is an impediment to expansion of high-value seafood exports to promising markets in the U.S., Europe and other areas.

C. Establishing Priorities

Possibilities exist for a five-fold expansion in export value in the high-value seafood industry in Guatemala.

Estimated Present and Future Potential
for High Value Seafood Products in Guatemala

Product	Present Value in Millions U.S.D.	Future
Marine Shrimp		
Boats	12	5-10
Ponds	2.5	26-31
Fresh Fin Fish	0.5	9+
Trout	---	10-15
Tropical Fish	---	5-10
Langostino		
Meal	---	1-3+
Oil	---	3+

Increased shrimp production and export of high-value aquatic products will require working with a dynamic sector to establish and enhance marketing infrastructure to alleviate production constraints and assure economically sound expansion. For other high-value products, it would be necessary to work with a relatively undeveloped and unorganized sector to bring about an understanding of supply dynamics, establish marketing infrastructure, and penetrate overseas markets.

1. Shrimp

Recommendations are as follows:

- o Further define the constraints to expansion of the commercial shrimp farming sector. Constraints would include but not be limited to the availability of land, seed stock, credit, technological assistance, government policy, and marketing infrastructure.

- o Provide technical assistance to address production, processing and marketing constraints affecting further development of the farmed shrimp industry.

- o Assist in identification and implementation of economic policy that will ensure the expansion of the commercial shrimp farming sector in an economically sound manner.

- o Assess the stability of current ocean capture operations and help producers to enter other capture fisheries to ensure that current production levels are maintained over the long term.

2. Other High-Value Products

Recommendations for other high-value products are as follows:

- o For selected species including but not limited to red snapper, grouper, corvina, spiny tail lobster, trout, salmon and tropical fish, analyze the strengths and weaknesses of the production/processing/ marketing/consumption chain and assist where possible in further development.

- o Determine the availability and disseminate information about resources (credit, technology, investment, etc.) to expand the production and export of high-value products.

- o Assist in the development of infrastructure for the export of fresh and smoked high-value products.

SECTION III

EL SALVADOR SUMMARY

On May 4th through 6th, the second part of this TDY, I traveled to El Salvador to meet with shrimp producers and potential investors. In El Salvador, Mr. Pedro Urquilla, director of ASPENT, served as host and facilitated all meetings and infrastructural needs for this survey.

During this short stay in El Salvador I met with several producers and groups interested in investing in mariculture. These groups expressed interest in: technical assistance for penaeid shrimp production; an analytical laboratory support system; macrobrachium production; fresh fish exports; oyster production; legal and institutional constraints on development; and capital and land use conflicts. Because of the short stay I was only able to meet with three producers and six investors.

I was surprised to find that in the last four years, an eminent shrimp producer has adapted Taiwanese technology to the environment in El Salvador. In the months preceding my arrival, this producer had, in small one-hectare ponds, harvested 5,000 lbs/hectare/4-month period, using hatchery seed. He was stocking at 15-19 post larvae/m^2 with 80-90 percent survival at harvest.

His was the only group I talked with that had integrated a functioning hatchery into its operation. It was structured so that both macrobrachium and penaeid post larvae could be produced. At that time, they were producing for their own needs. From January through May they had produced 1.5 million P. vannamei, 1.5 million M. rosenbergii, and small quantities of M. tenellum. Some of the M. rosenbergii Pl's are sold for C/.25 each just before the rainy season. Their harvest data seemed adequate, with growth to 30-40 g in 3 months, and yields of 1500-2000 lbs per hectare. This range is given as larger animals are cull-harvested and sold to a restaurant market for C/25/lb. It is estimated that this market would remain at its present high value if not saturated. A saturation point for the El Salvador market is estimated at about +/- 20 hectares of productive area.

The technology employed by this company is unique in Central America and fits well within the legal and institutional constraints on penaeid shrimp production in El Salvador. A group of investors I met with were proposing that a series of between 500 and 600 production modules be set up, each containing 4 to 6 1/4 hectare units and sufficient infrastructure cost shared among the producers to enable each module to produce between 6,000 and 9,000 lbs of shrimp/4-month period. A financial and technical

analysis of this approach needs to be more closely evaluated. Modules could be sold to those retired from or wounded in the present internal conflict. Such modules would have to be supported by a hatchery, feed mill, analytical laboratory, technical assistance, and initial and ongoing training in appropriate techniques. Even though this approach would require a long-term commitment, it appears to be a creative way to 1) expand the development of mariculture in El Salvador within the present agrarian reform laws, which 2) would allow entrance into the industry of small- to medium-scale investors.

I also met with a producer from the La Union area who had a 48-hectare production unit composed of three nursery and three grow-out units. The technology employed in this operation appeared most similar to that of Ecuador and Panama in that it relied on low-cost inputs and wild seed and appeared to have a wider profit margin even though overall production quantities were lower. In the eastern part of the nation there appears to be between 15,000 and 20,000 hectares where it seems feasible to practice this type of mariculture. Further development of this technology appears to be limited by credit availability and land use laws. If an equitable solution could be found to alleviate the legal constraints, this type of production in the eastern part of El Salvador could do much to provide a new source of income to rural coastal populations.

The export of high-value seafoods such as table fish is just now being explored. Technical assistance to these exporters should focus on post-harvest techniques to reduce losses and extend the shelf-life of fresh fisheries products.

Before leaving El Salvador, I met with Mr. Mario Molino and Mr. Agustin Martinez of FUSADES to inform them of my findings. At this meeting, private sector representatives proposed that follow-up technical assistance to develop the shrimp and high-value seafood sector be immediately undertaken.

SECTION IV

HONDURIAN SHRIMP INDUSTRY SUMMARY

On May 7th through 11th, Mr. Juan Montoya of FEPROEXAAH and I traveled to the southern coast of Honduras, where we met with Mr. Rigoberto Duarte, president of the Hondurian Shrimp Producers Association, as well as several other prominent producers. Mr. Duarte facilitated a rapid tour of 12 shrimp farms, which represented a wide cross-section of the industry. My findings are summarized in the annex.

Three large-scale farms, Granja Marina (565 ha), Sea Farms of Honduras (270 ha), and Duarte de San Bernado (252 ha), provided approximately 86 percent or 1.7 million pounds of the total shrimp tails produced in 1987. These operations, with the exception of Sea Farms, are expanding and have plans to continue to expand over the next few years. Their growth should be encouraged as it will tend to stabilize the industry. As leaders, these farms will serve as technical training centers for those newly entering the industry. Moreover, in conversations with leaders at these operations I quickly realized that they understood many of the interrelationships between shrimp production and the environment. This understanding needs to be passed on along with technical information so that the industry can achieve a stable future. When the shrimp farm industry expands to its full capacity, which I estimate at 21,000 hectares, annual earnings could exceed $ 110+ million.

I visited several small-scale shrimp farms and salt-drying areas. There appears to be a great deal of interest in shrimp production but many small producers do not as yet have access to basic information to enable them to get started. Salt producers need an alternative income, and perhaps artemia production could be that alternative. In any event, brine shrimp production potential should be assessed.

In conversations with shrimp producers, several areas of common concern were found, among them the "larva problem." Although the availability of post larva is not presently a problem, many supported the idea of a basic study of post larvae populations, focusing on the industry's development potential and probable constraints.

If there must be closed fishing seasons, then they should take place for biological reasons and should address issues such as the appropriateness of the seasons, the lengths of the seasons, and the life stages (Pl or adult) of the shrimp.

Several persons indicated that such a study should also look at the interactions of the environment on shrimp production. Not too many years ago cotton production was a major export commodity. The analysis of insecticide-herbicide residuals in soils should be standard practice in the site selection process.

Of particular interest is the Japanese-Government of Honduras Choluteca River Irrigation Project, which will place several dams to limit the flow of fresh water into the estuary. More damaging than the resulting increased salinities could be the impact of pesticides and biological control of insects on non-target species. In several areas insects are controlled by virus and other means.

Up to 40% of the Gulf of Mexico shrimp fishery carries some form of Baculovirus spp. Shrimp production in ponds requires "clean" feeds and water and healthy post larvae. As stated earlier, long-term exposure (30 days) of DDT at 1.5 PPB has been shown to enhance the virulence of viral infection in Penaeus vannamei. Is it worth placing a growing shrimp culture industry, with greater than $110 million potential annual earnings, at risk? Will what may be considered upland gains, in terms of increased income and employment, be more than offset by losses in the shrimp industry?

Another overwhelming area of concern expressed by all producers was technical assistance. A primary focus of such assistance should be the small- and medium-scale producers so that they do not fail during the learning phase. Assistance could be facilitated through the larger operations, but a catalyst is necessary.

Common problem areas include: 1) handling of post larval shrimp; 2) farm management practices; 3) treatment of product at harvest and shortly thereafter; and 4) development of technical information modules and field days to share knowledge.

Finally, several persons expressed the need for assistance at the policy level, so that the shrimp producers association could take a leadership role in helping the government establish rational policies.

Before leaving Honduras on the 11th of May, I met with several USAID mission personnel to inform them of my findings. USAID recently undertook a geomorphic-ecological survey of the west coastal area. It also appears that the mission may assist the private sector to undertake a longer-term study of shrimp fishery resources to ascertain their development potential. In my experience, water quality and the availability of suitable land for pond sites become limiting factors long before post larvae. But in any event, a survey of shrimp resources, post

larvae, and adult fisheries, taking into account information from the whole of the Gulf of Fonseca, would provide a rational basis for future GOH policy.

ANNEX

SUMMARY OF The HONDURAN
SHRIMP INDUSTRY

1) Pond Area (in hectares)

Total Salina Area	32,914
Total Productive Area Available	21,000
Total Area Under Construction	2,200
Total in Production	1,585

2) Construction Costs

U.S.D. 3,900-5,000/hectare

U.S.D. 15-20 million in loans

3) Source of Capital Invested

>85	(%)	U.S.
<10	(%)	Honduras
> 5	(%)	Other

4) Type of Land Used for Construction (%) of Pond Area

Mangroves	10 %
Salinas	80
Agricultural & Pasture	10

5) Total Production Exported

	YEAR	QUANTITY (Lbs)	APPROX. VALUE
Total	1985	+/- 1,500,000	6 Million
	1986	2,049,000	8.2 "
Projected	1987	2,500,000	10.0 "

6) Management and Technology

Management Type (%) of Area	Seed Pl/M	Cost US/Ha	Feed Conversion	Production Lbs/Ha	Size (U/Lb)
Semi-Intensive (35)	5-7	7-1400	3.5:1	1,200+	36-40
Semi-Extensive (20)	3-5	7-1000	3.5:1	1-1200	41-50+
Extensive (45)	<3	3-600	None	4-600	31-35+

NOTE: Present stocking strategy is to stock juvenile shrimp (.7-1.0 g in size) from June through November, and smaller post larval shrimp, "La Fina," during the rest of the year. During the rainy season, culture time can be reduced to two months' duration, yielding two harvests of U 51-50 and another harvest in the dry season yielding U 31-35+.

7) Seed Stock Availability

Hatchery and wild seed availability
(+ Indicates >50% of Pl population is of one species)

P.van	P.styl	Month	Cost/1000 Pl
	+	J	
+	+	F	
+		M	
+		A	
+		M	
+		J	2 lempera
+		J	
+		A	
+	+	S	
+	+	O	
	+	N	
	+	D	

Wild Seed Capture

1986 Number of people employed in seed collection < 150

Hatcheries	Status	Number	Capacity
	Operational Planned Not Operating	ONE	20 Million/ Month

Seed needed to stock @ 1,585 ha = 3.17×10^8 total

Future requirements @ 21,000 ha = 4.2×10^9 total

Assuming: 21,000 ha x 50,000 Pl/ha x 2 harvests/year x 1/0.5 (50% survival) = 4.2 billion post larvae

8) Problems and Opportunities

- Convert salinas to brine shrimp production to reemploy 2,000-3,000 people in salt drying industry. 1,000-1,500 ha, 60-100 MT cysts potential.
- Potential source of foreign exchange earnings $109+ million annual earnings
- Develop feed industry
- Sourcing: potential to immediately increase Pl availability
- Hatchery development
- Assess sustainable yield of post larvae Pl availability future potential limiting factor
- Water and soil quality assurance
- Improve pond management practices Basic knowledge not universally known
- Wild seed stock & adult shrimp fishery
- Loss of marginal operations
- Fishing fleet reduction potential benefit
- Closure of fishing seasons? Why, how long, when?

9) Potential Environmental Impacts

- Increase in shrimp population
- Increase in bird population
- Potential decrease in water quality
- Development of existing concessions
- Potential increase in some wild seed stock populations
- Expansion of pond systems into mangrove and/or agricultural lands: unlikely

10) Interactions

- Shrimp boats, potential overfishing
- Reseeding of estuary due to maricultural activities
- Loans to integrated enterprises
- New construction
- Land and capital use conflicts
- Watershed-estuary interactions
  chemically intensive agriculture & viral diseases
- Upland empoundment of freshwater supplies,
  increasing salinity & pesticide load to estuary primary
  potential factor limiting future development