Japan International Cooperation Agency (JICA)

Ministry of Agriculture and Livestock
Fisheries and Aquaculture Development Center

THE STUDY

ON

ARTISANAL FISHERIES DEVELOPMENT

IN

THE REPUBLIC OF EL SALVADOR

MAIN REPORT

SEPTEMBER 2002

IC Net Limited

P R E F A C E

In response to a request from the Government of the Republic of El Salvador, the Government of Japan decided to conduct a Development Study on Artesanal Fisheries Development in the Republic of El Salvador and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Hiroaki Yonesaka of IC-Net Limited, six times between September 2000 and July 2002.

The team held discussions with the officials concerned from the Government of El Salvador and conducted field surveys at the study area including the implementation of pilot projects. Upon returning to Japan, the team conducted further studies and compiled the final results in this final report.

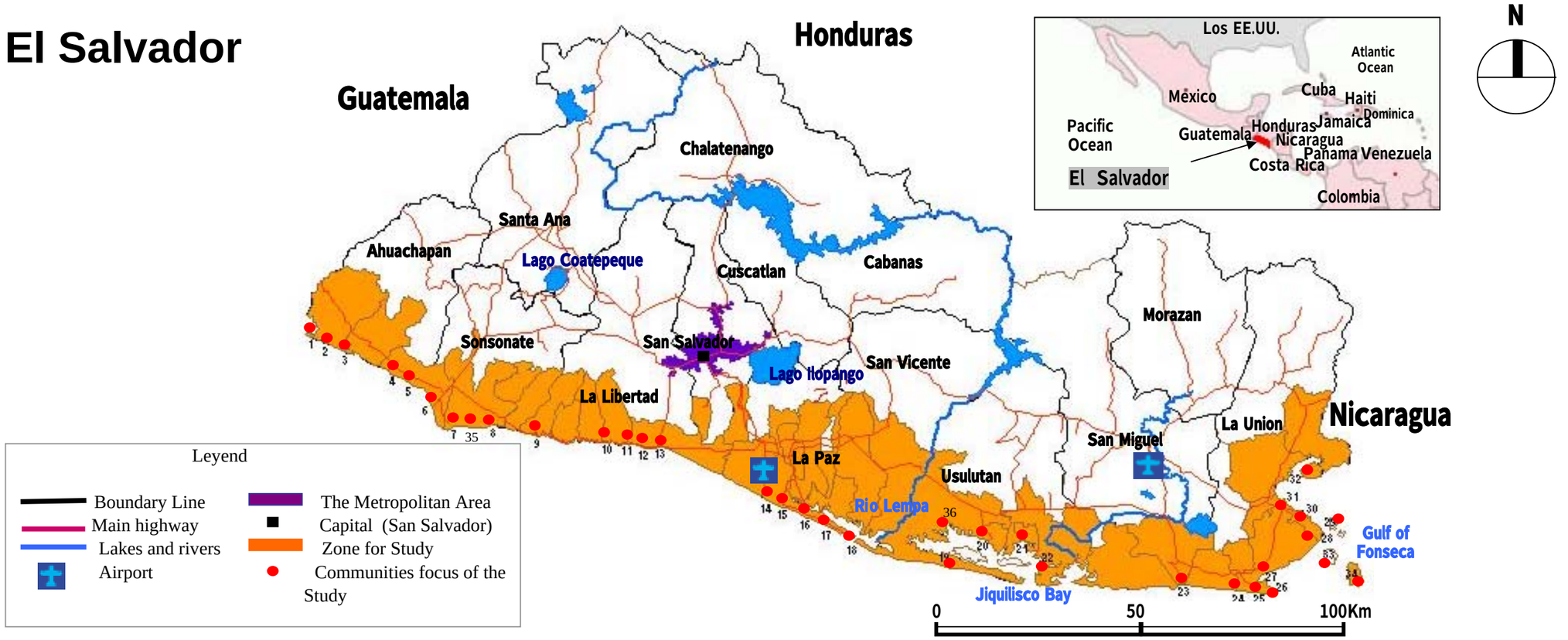
I hope this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned from the Government of El Salvador for their close cooperation throughout the study.

September 2002

Takao Kawakami
President
Japan International Cooperation Agency

El Salvador



1 **Bola de Monte**
Ahuachapán, San Fco. M.
Garita Palmera

2 **Garita Palmera**
Ahuachapán, San Fco. M.
Garita Palmera

3 **Barra de Santiago**
Ahuachapán, Jujutla
Barra de Santiago

4 **Costa Azul**
Sonsonate, Aacajutla
Metalio

5 **Metalio**
Sonsonate, Acajutla
Metalio

6 **Puerto Acajutla**
Sonsonate, Acajutla

7 **Los Cóbanos**
Sonsonate, Acajutla
Punta Remedios

8 **Barra Salada**
Sonsonate, Cuisnahuat
Salinas de Ayacachapa

9 **Metayo**
La Libertad, Teotepeque
El Nispero

10 **El Sunzal**
Sonsonate, Santa Isabel Ishuatan

11 **El Majahual**
La Libertad, Puerto de La Libertad
Majahual

12 **Los Filtros**
La Libertad, Puerto de La Libertad

13 **Puerto de La Libertad**
La Libertad, Puerto de La Libertad

14 **Pimental**
La Paz
El Nispero

15 **San Marcelino**
La Paz, San Pedro Masahuat
San Marcelino

16 **Los Blancos**
La Paz, San Luis La Herradura
San Antonio Los Blancos

17 **San Luis La Herradura**
La Paz, San Luis La Herradura

18 **Isla Tasajera**
La Paz, San Luis La Herradura
San Rafael Tasajera

19 **Isla de Méndez**
Usulután, Bahía de Jiquilisco
Cantón Isla de Méndez

20 **Puerto El Triunfo**
Usulután, Puerto El Triunfo

21 **Isla Pirrayita**
Usulután, San Dionisio

22 **Puerto Parada**
Usulután, Usulután
Puerto Parada

23 **El Cuco**
San Miguel, Chilanguera
El Cuco

24 **Playa Torola**
La Unión, Conchagua
Cantón Las Tunas

25 **Maculiz**
La Unión, Conchagua
Cantón Jaguey

26 **El Jaguey**
La Unión, Conchagua
Jaguey

27 **El Tamarindo**
La Unión, Conchagua
Tamarindo

28 **Playitas**
La Unión, La Unión
Playitas

29 **Isla Zacatillo**
La Unión, La Unión
Zacatillo

30 **La Unión**
La Unión

31 **El Guisquil**
La Unión, Conchagua
Gusiquil

32 **Chapernal**
La Unión, San Ajelo
Chapernal

33 **Isla Conchaguita**
La Unión, Isla Meanguera

34 **Isla Meanguera**
La Unión, Isla Meanguera

35 **El Zope**
Sonsonate

36 **Puerto Avalos**
Usulután

Communities object of the Study in the coast of the Pacific Ocean of El Salvador

(Communities in dark are priority communities)

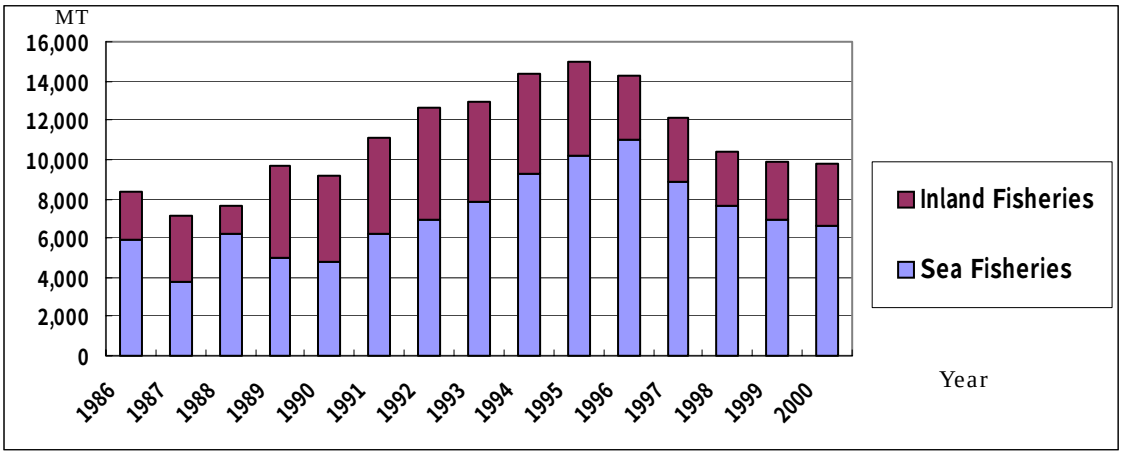
SUMMARY

Summary

1. Profile of the Present Study

The fisheries sector of El Salvador is divided into three large categories: industrial shrimp trawling for export purposes; products mostly marketed in the local market; and artisanal fisheries in inland waters such as lakes and lagoons. In addition to the above, aquaculture (tilapia and shrimp farming) is also practiced, although at a very small scale and is generally not very developed in terms of commercialization. Regarding the fish product processing sector, with the exception of shrimp exports, the only processing carried out is fish drying (and salt bathing) by the fishers themselves or middlemen, and the manufacture of ice on a small scale. The fisheries sector represents a small percentage of the national economy: only 0.4% of GDP and 3.9% of the agricultural sector GDP. However, it is a very important sector from the perspective of the acquisition of foreign currency through exports and employment.

According to statistics of the Fisheries and Aquaculture Development Center (CENDEPESCA) of MAG, as shown in the graph below, the total Salvadoran catch experienced growth from 8,362 MT in 1986 to 14,999 MT in 1995. However, this figure declined to 9,755 MT in 2000. From the total catch of 9,755 MT, 6,665 MT corresponds to sea fisheries, of which 2,099 MT (32%) is for industrial fisheries, and 4,566 MT (68%) for artisanal fisheries. The decline in the catch over the past few years is partly due to the impact of Hurricane Mitch (1998) and deterioration of the fisheries ground environment. However, pressure of overexploitation that is gradually affecting the availability of coastal resources also cannot be ignored. Originally, El Salvador’s artisanal fisheries lagged in terms of development of fishing techniques, fishery management, processing of fishery products, and fisheries cooperatives, with low productivity that has worsened over the past couple of years.



Source: Fishery and Aquaculture Statistics 2000

Figure: History of Fisheries Production in El Salvador

Inland water fisheries are only artisanal and mainly target tilapia in lakes. Nevertheless, this sub-sector is significant as it represents one quarter of the total national catch. Notwithstanding, the catch also experienced a temporary increase between 1986 and the mid-1990s, from 1,816 MT to 4,000-5,000 MT, respectively, but has since followed a downward trend similar to sea fisheries, which saw their catch halved in 1999 (2,653 MT).

The rescue of artisanal fishers from poverty is one of the social tasks facing the Government. In addition to low productivity and a deficiency of social services in fishery communities, there has been an increase of artisanal fishers due to the migration of refugees to coastal areas to escape the conflict that plagued the country from 1979-1992. This is also one of the causes of the poverty that persists in coastal fishery communities, and it is common to find families living on remittances sent from relatives who have emigrated to the United States in search of work.

Within this context, the present Study has been developed to provide support to CENDEPESCA and prepare a Master Plan aimed at the comprehensive development of artisanal fisheries to increase employment opportunities, mitigate poverty in coastal areas, and promote fish consumption in an effort to increase the rate of food self-sufficiency. For 2 years, beginning from September 2000, activities mainly focused on collecting necessary information and implementing the pilot projects listed below.

(1) Fisheries Statistics Improvement Project
(2) Project in Support of the Formation of Fishers' Organizations
(3) Women's Economic Status Improvement Project

(4) Artisanal Fisheries Diversification Project

2. Current state of the fisheries sector in El Salvador

(1) Fishing Society

Originally, artisanal fishing in El Salvador was carried out by peasants living in coastal areas for self-sufficiency, and its history as an economic activity it only dates back to the 1950's. Particularly since 1960, the number of permanent residents in fishing villages has increased. At the same time, as a result of an increase in political violence in the northern and eastern regions from the late 1970's to late 1980's, there has been an increase in the number of people migrating from inland areas to fishing villages and from the northern and eastern regions to the west region.

Construction of social infrastructure of the fishing communities including roads, electricity, schools, etc., begun in the 1970s, but was delayed due to prolonged political violence in the 1980s. The signature of the Agreement of Chapultepec in 1992 marked the restart of projects and many fishing communities were provided with water supply systems, health posts and telephone services.

Table: Fishing Communities Classification

① Urban	• Predominance of workers in the services and commercial sector rather than the fisheries sector.	The main fishing ports are: Acajutla, La Libertad, Herradura, La Unión, etc.
② Combination of fishing and agriculture	• People dedicated to fishing during the agricultural unemployment period.	Bola de Monte, Garita Palmera, Costa Azúl, Metalio, Metayo, El Zunsal, Majahual, Los Filtros, Pimental, El Triunfo, El Jaguey, Isla de Zacatillo, etc.
③ Fishing community exclusively engaged in commerce	• Mainly dedicated to fishing shrimp and fish.	Los Cóbanoss, San Marcelino, San Antonio Los Blancos, El Cuco, Playa Torola, El Maculis, El Tamarindo, Playitas, Isla Conchaguita, Isla Meanguera, etc.
④ Combination of fishing with fishing boats and mollusk extraction	• Equal number of fishers fishing in boats and fishers mainly engaged in mollusk extraction. • Predominance of women engaged in fishing activities.	Barra de Santiago, Isla Tazajera, Isla de Méndez, Isla Pirrayita, Puerto Parada, El Guisguil,
⑤ Fishing community exclusively engaged in mollusk extraction	• The main occupation is mollusk extraction in mangrove forests.	Small communities inside the Jiquilisco Bay, Chapernal, etc.

Source: Results of the RRA conducted by the Study Team

(2) Coastal Fisheries

The continental shelf extends from the coast of Nicaragua to the border of Guatemala, and narrows as it approaches Guatemala. The distance from the coast to fishing banks (depth of 50 m) is approximately 7.5 miles at Barra de Santiago, near Guatemala, and 5 miles at Los Cóbanos. This distance increases up to 10 miles at Puerto La Libertad.

The principal zone for fishing white and brown shrimp as well as for artisanal fisheries with gill nets, is up to a depth of 50 m. Here, the distance to the coast is 10 to 20 nautical miles. The fishing zone for Chilean prawns (Pleurondoces planipes) is between depths of 100 m to 250 m, and 40 nautical miles from the coast. At depths of 200 m or more, and 600 nautical miles or more from the coast, shark longline is carried out. Within the EEZ of El Salvador, several Costa Rican vessels of longline tuna fishing boats as well as two Spanish tuna fishing vessels operate. (Refer to the fishing zone map in Chapter 4).

(3) Fishing Gear and Methods

In spite of the short history of coastal artisanal fishing, one can affirm that fishers have mastered the construction and repair of small types of fishing gear. However, fishers invent very little and do not practice other fishing methods besides gillnetting or longlining.

(4) Production Costs

Fuel represents a high percentage of the total cost of production for artisanal fishing. The recent rise in the price of gasoline and a fall in capture are affecting the profitability of this sector, so much so that fishers are forced to postpone operations. Many of the fishers try to increase the speed of their boats unnecessarily by equipping them with large motors, regardless of the type of fishing method or fishing conditions. If the price of fuel rises in the future, fishing might become unprofitable when there is not enough catch.

(5) Shrimp Fisheries

Shrimp fishing is the nucleus of the Salvadoran fishing industry. However, since 1997, capture volumes have fallen, seriously affecting both large commercial companies and artisanal fishers. Shrimp fishing began during the 1950’s and experienced extremely rapid development. However, reports of overexploitation began to surface in 1968, and successive reports followed. However, it was not until 2002 that effective measures were taken and a total ban of shrimp fishing was implemented for a month.

Artisanal fishers used to enjoy relatively high income due to the high commercial value of shrimp.

Recently, however, after it became difficult to catch shrimp, some fishers have not been able to fish since they are unable to cover the cost of fuel. It is deduced that this situation is due to changes in the environment and intense fishing of demersal fish and shrimp along the coast.

(6) Development of Underutilized Resources

It is estimated that there are populations of approximately 50,000 MT of small pelagic fish including sardines and anchovies, and 15,000 MT of jacks (Carangids), mackerel, and other medium pelagic fish along the coast of El Salvador. There are also large populations of skipjack, yellow fin tuna, dolphin fish, marlin and other large pelagic fish. Among the demersal fish, it was found through this study that conger eels caught as a by-catch during shrimp trawling or artisanal longlining are not well utilized as commercial products.

The underutilization of these resources is mainly due to the absence of an established market and/or the low prices for these species. However, with coastal stocks of shrimp and demersal fish at all time lows, it has become an urgent task even for artisanal fishers to take advantage of underutilized resources efficiently. If the demand for fish increases through new forms of cooking and processing techniques, it could offer the market low cost raw materials. For this reason, utilization of under-exploited resources is one key to diversification and sustainable development of the artisanal fishing sector.

(7) Fishery Education

It is doubtful whether the Salvadoran fisheries sector requires a large number of technically trained personnel, and from previous experience, it is probably not necessary to have permanent fishery educational centers. However, it is necessary to improve the accessibility of training for a majority of the fishers. It is expected that training for fishers will increase interaction between CENDEPESCA personnel and the fishers, thereby increasing opportunities for communication regarding the training needs of fishers.

(8) New Fishing Law

A new fisheries bill was approved and put into effect by the national assembly in December 2001. The following is a basic outline of this new fishing law.

① Policy decision-making to be based on participation of the relevant sectorial actors. (Articles 11, 12)
② Adoption of the concept formulated by FAO on “Responsible fisheries”.
③ Regulations and concession of fishing permits consistent with the results of resources

inventory and monitoring. (Article 17)

④ Decision-making on closed-season policies and closed areas with the participation of the various actors. (Articles 28, 29)

⑤ Abolition of the prohibition of trawling within the 3 mile zone.

⑥ Applications to replace old ships will only be allowed (particularly for shrimp trawling) taking into account conditions of the resources, power and age of the vessels. (Articles 35, 40)

⑦ Replacement of the license concession system; licenses will be attached to ships instead of ship owners. (Article 58)

⑧ Legalization of penalty amounts (Articles 74 to 84)

(9) Resource management

The management of resources is conducted in three ways: governmental management, community management and “co-management” (joint management). At present, both industrial as well as developing countries are focusing efforts on co-management since governmental management is extremely costly and community management requires a long start-up. El Salvador is not an exception.

The previous Fishing Law included fishery management-related provisions but did not establish a management system to carry out this task. Therefore, management was limited to providing support to some groups of fishers who were aware of the critical situation and started incipient fishery management activities. The following is a summary of the present difficulties under the New Fisheries Law.

1) Underdevelopment of Fisheries Organizations
2) Lack of scientific data on resources
3) Limited capacity of CENDEPESCA
4) Existence of artisanal fishers that depend morallas fish from shrimp trawling boats

It is necessary to take into account these difficulties when considering the design of a fisheries management plan. It is very probable that with the enactment of the new fisheries law protecting areas, the formation of groups of fishers carrying out fishery management activities in fishery communities will take place. In addition, compared to neighboring countries, fisheries in El Salvador are characterized for their high percentage of mollusk extraction. A fisheries management plan will be easy to plan because mollusks are resources of fisheries, which are

considered easy to manage because they do not migrate very far. Therefore it is considered easier to design a fishery management plan.

Fisheries management should be based on the “co-management” concept aside from conventional patrolling by the Navy or the Police under the “top-down” system. This should include coordinated and meticulous actions combining the different fisheries resources, fishing and catch grounds management methods taking into account the different social factors of the fishing communities, as well as the ecology, the conditions of the fishing areas, and the fish catch to be managed.

(10) Trading of fish products

El Salvador’s export volume of fish products fluctuated from 3,378 MT (US $23.83 million) in 1991 to a peak in 1996 with 6,984 MT (US $52.9 million), but declined to 2,518 MT (US $18.4 million) in 2000. Exports primarily consist of frozen shrimp, which represented 1,525MT (60%) of total exports in 2000. The majority of exported fish products are destined for the US.

On the other hand, imports of fish products have also fluctuated, rising from 390 MT (US $1,500) in 1991 to 7,013 MT (US $6.338 million) in 1994, but they gradually declined to 3,837 MT (US $5.87 million) in 2000. Imported products are primarily canned sardines, tuna, fish meal and frozen shark from Costa Rica, Peru and Mexico.

(11) Fish Marketing

Most assemblers/intermediaries are boat owners who are also active as producers. This situation is similar in all landing sites. A noteworthy feature is the dominance of women fish traders who bring their fish to consumer markets to sell to retailers and wholesalers. The buying and selling methods at landing sites is based on the established relation between assemblers/intermediaries and the fishers through the provision of fishing inputs and credits. There are assemblers/intermediaries who obtain their supplies through informal contractual arrangements with fishers, and assure the traders a constant supply. Assemblers/intermediaries provide assistance in cash or fishing inputs such as fuel and ice to fishers.

Until now, it was deemed that the annual per capita consumption of fishery products was very low, some 2.4 kg. However, the present study has estimated a minimum of 7.0 kg. In any case, it is estimated that there are approximately 36,000 MT of fish products marketed in the country not counted in CENDEPESCA statistics. A break down might be as follows: 1) morallas from trawling boats, 2) fresh fish not included in the statistics, and 3) products brought in the country

without going through customs.

Most of the fish in the area are landed on beaches and simple concrete jetties, except for two major fish landing sites at Acajutla and La Libertad (the Muelle).

(12) Fish Product Processing

There are two types of processing methods: industrial processing and artisanal processing. The majority of the owners of large size processing factories are also owners of shrimp trawling boats that process shrimp for export. In the past few years, new types of processing companies that produce shellfish cocktails and pickled fish have appeared in the market. However of the 21 processing companies throughout the country, only 4 meet HACCP standards.

From the results of the study, it is estimated that one quarter of the fish landed in the artisanal fishery sector is processed. Artisanal fish processing is in many cases a seasonal activity that commences from around November until April in preparation for the holy week (Semana Santa). However, no matter the season, fresh fish that is not sold is dried and salted.

(13) Aquaculture

The main aquatic organism of aquaculture in El Salvador is shrimp. Shrimp is the only product cultivated at a commercial scale, although fish appear in the statistics because they are cultivated together at some shrimp farms. Besides this, *Anadara spp.* (also referred to as ark shells) has been recently introduced on an experimental basis as natural resources have decreased over the last few years. The following are problems that the aquaculture sector faces in El Salvador.

1) Limited capacity of local larvae supply not being able to satisfy the national demand
2) Concern over the influence on shrimp resource availability along the coastline due to exploitation of natural larvae
3) Lack of development of shrimp farming technology in salt-pans
4) Lack of efficiency on disseminating aquaculture techniques
5) Theft of cultivated ark shells
6) Cultivation of ark shells may lead to uncontrolled exploitation of natural shells

(14) Organization of Fishers

The only organizations of fishers in the artisanal sub-sector of El Salvador are cooperatives. Of the 62 fishery cooperatives that operate along the coast (including two federations), 42 are “operating”. However, in reality there are only 14 cooperatives operating. There are 382 members

in these cooperatives, which represent less than 3% of existing fishers in the country. Therefore, this group of fishers is not the most representative within the national artisanal fishers population.

All cooperatives have been organized for different reasons, but all have the common goal of gaining access to internal or external assistance. This approach is endorsed by the fact that many cooperatives have not had any access to assistance or have used up all the funds that have been granted to them and suspended operations. The main activity carried out by the fishery cooperatives in El Salvador involves the purchase of the catch made by members with fishing boats and gear belonging to the association, and follow-up marketing activities. Aside from profits made from the sale of catches, the cooperatives receive money from leasing out the fishing boats and gear. In addition to internal problems, the decline in the catch over the last years has translated into a fall in income of the organizations, and many are facing financial problems. In the past, La Libertad fisheries cooperatives (ACOPELI) had received cooperation from Japan and built ice-making facilities, but was declared bankrupt in January 2002.

There is a low expectation that the rate of membership of fisheries cooperatives will increase significantly over the next few years. The lack of an organization, not limited to cooperatives, covering all of the fishers is the bottleneck in the promotion of development of the fisheries sector. The main problems resulting from this situation are described below.

(1) Difficulty in co-managing fisheries resources
(2) Lack of access to credit services
(3) Lack of access to efficient training and technical assistance by the government
(4) Lack of bargaining power to negotiate with shrimp trawlers

(15) Fisheries Statistics

Itemized statistics of the agricultural, forestry and fisheries sector are managed by the Ministry of Agriculture and Livestock (MAG), and those corresponding to the fisheries sector are published in the CENDEPESCA's Annual Fisheries Statistics. Data related to fishing statistics in this publication are divided into seven sections: 1) industrial fisheries, 2) marine artisanal fisheries, 3) inland waters artisanal fisheries, 4) fresh water aquaculture, 5) marine aquaculture, 6) trade, and 7) fisheries production by department and species.

Concerning industrial fisheries (for shrimp), inspectors register the amount unloaded upon disembarking. Processing plants then report the processing volume of each boat on a monthly basis to the Statistics Department of CENDEPESCA. Additionally, the Statistics Department

receives a report on the balance of exports from the Central Bank, being a system that obtains different information at each stage from the volume of capture to the volume of exports. Regarding statistics for artisanal fisheries collected by CENDEPESCA's staff, they rely on not very reliable samplings. The European Union has provided technical assistance regarding fisheries statistics in the past. However, the recommended system for the implemented program has not been fully utilized, perhaps because it has not been adapted to the technical capacity of the recipient institution.

16) Environment

One environmental problem related to the development of artisanal fishery communities is the conservation of resources in mangroves where inhabitants use wood as a fuel. For example, it is necessary to be aware of how to obtain fuel resources for the processing of marine products. In the case of processing plants run by families (artisanal fishers), it would be difficult to look for sources of energy other than materials extracted from mangrove swamps. Therefore, parallel to the development of the processing industry, it is necessary to promote mangrove swamp reforestation and provide assistance for the extraction of firewood and wood coal from the plantations.

Another problem is how to control the re-collection of turtle eggs, which constitute a seasonal source of income for artisanal fishers because of their demand in the market. For this reason, it is believed that egg collection will continue even if the income of fishers increases. In other words, unfortunately the promotion of artisanal fisheries development does not necessarily alleviate the negative impact that falls on the turtles. In addition to this problem, the development of fishery communities could destroy spawning locations. Therefore, it is necessary to study the situation in each fishery community since sea turtles spawn on almost all open sandy beaches in El Salvador.

Concerning fishery product contamination by heavy metals and agrochemical products, a more accurate study has to be conducted of arsenic found in *Pteria spp* and contamination by aluminum in La Unión. With regards to the rest, it is deemed that their level does not yet require short-term measures. In any case, great care should be given to contamination by heavy metals in urbanized areas such as Acajutla, La Unión, La Libertad, etc. as well contamination by agrochemical products in the Jaltepeque Estuary and La Unión.

(17) CENDEPESCA

One of the challenges in promoting artisanal fisheries in El Salvador is to strengthen the organizational ability of CENDEPESCA. The basic problems that CENDEPESCA face, which

are related to current organizational adjustments being undertaken, are listed below.

(1) Although the Organizational Adjustment Master Plan establishes basic challenges and activities, priority tasks have not been clearly defined
(2) A clear time schedule of activities has not been defined
(3) The goals (indicators) of the intermediate evaluation and the evaluation method have not been defined
(4) The planning system has not been standardized
(5) There is no organizational adjustment official team
(6) Administrative units are still large
(7) Specific steps to strengthen local offices have not been defined

3. Pilot Projects

As previously mentioned, this study implemented 4 pilot projects. The results of these projects were fed back into the Master Plan. The following is an outline of the 4 pilot projects.

(1) Project for the Improvement of the Fisheries Statistics System

The current statistical fisheries system estimates fish catch volume through samplings. However, there are too many sampling points, creating large margins for statistical errors. In addition, from the collection of data to the statistical data output, the system is very inefficient as it takes more than a year to publish the data. As one of the pilot projects, it was recommended that the number of sampling points fit CENDEPESCA's abilities and that the concept of "territorial zoning" is used.

The activities carried out began with the design of a sustainable basic system, taking into account the current organizational ability of CENDEPESCA. Based on this, the next step was the selection of sampled communities, preparation of the methodology for sampling, elaboration of a text, selection of data gatherers and updating of fishing boat registration to organize the collection of data in fishery communities. As a result of these efforts, the performance of data collectors has been satisfactory in general terms, though time consuming.

Design and Programming of the Statistical Data Processing System

The design, programming and testing of the database were carried out. For the design of the database, the "Objective-oriented approach" was applied and the Office2000 Access database was used considering compatibility issues with other types of databases employed by the

Statistics and Informatics Department. One important aspect has been to establish a basis for post management of the program upon finishing the Project and using the most of the basic functions of “Access”. A gradual process was used for programming the statistical data processing system. Some manual work is necessary in some parts of the program when processing the data, however, the objective was achieved: “More rapid data output”. Only two or three errors were detected and corrected in a timely fashion by the C/P.

Training on Data Processing Software

Training was conducted for the C/P in charge of managing the software and installation of the equipment. The installed equipment is working satisfactorily. In addition, a manual for the data processing system and statistical system were created.

(2) Project for supporting the formation of fisher organizations

Fisher organizations in El Salvador have not developed significantly and fishery cooperatives are the only fishery organizations, not only having very low memberships, but many also face economic difficulties. Thus, the formation and strengthening of new artisanal fisher organizations is urgent. The pilot project has the objective of creating a successful model working with fishers that have a high level of awareness of management of coastal resources.

Since the Project was carried out with the purpose of achieving active management of coastal resources by the fishers, it was decided that activities should use the participative method. A meeting was held with the fishers of Barra de Santiago immediately after the arrival of the Study Team to form fisher organizations for the management of coastal resources through the construction of artificial reefs and establishment of protected areas.

The construction and implementation of artificial reefs first took place on August 22, 2001. The construction and implementation of artificial reefs continued to take place even after the Study team returned to Japan. As a result of interference from industrial boats and artisanal fishers from other communities (float cable cuts and/or moving artificial reefs), installation points were lost. However, the presence of groupers (3~40 cm long) around the installed anchors was visually confirmed. The participating fishers reported catching snapper (pargo) at the installation site, which had never occurred in that area before.

Workshops were carried out in 4 neighboring communities. As a result of these meetings, San Marcelino was added as a target group of the Project. A diffusion event was also planned and carried out in Barra de Santiago. The event was prosperous and was attended by the Minister of

Agriculture and Livestock, and the Ambassador of Japan among other guests. The Project managed to seize the opportunity to use funds from a small-scale grant from Japan to expand the Project. The Study Team and CENDEPESCA backed an NGO for the smooth development of activities.

(3) Artisanal Fisheries Diversification Project

Artisanal fisheries in coastal areas of El Salvador focus primarily on bottom fish species such as croakers, snappers and shrimps. Although demarsal resources are depleting in the coastal areas, there are some resources that are not being sufficiently exploited, such as sardines, anchovies, skip jacks, amber jacks and conger eels. The reasons for not catching these species are that there is not a market established for them and that the artisanal fishers do not have enough knowledge about equipment or methods to innovate. Therefore, the objective of this Pilot Project is to determine the potential to better utilize the said resources from the perspective of demand (processing and sales promotion) and supply (fishing).

The pilot project was divided into 4 sub-projects: Study on the current utilization of underexploited fisheries resources; testing of new fishing methods; development of methods for processing fisheries resources, and promotion of processed fisheries products. In addition, the project was implemented in collaboration with the fishers and processors of fisheries products.

Study on the current utilization of underexploited fisheries resources

The following information regards the usage of underexploited resources.

Table: Information on Underexploited Resources

Species	High fishing season	Fishing ground	Fishing method	Annual catch	Application	Colones/lb (at landing point)
Conger eels	Year round (Dec-April)	East of Lempa river	Palangre, Morallero	>600 tons	Dried-Salted	0.5-6
Skip Jacks	Year round	All of the coast line	Hand line	Unknown	Bait for setline	0.5-1.5
Amber Jacks	Year round	All of the coast line	Hand line	Unknown	Bait for setline	0.5-3.0
Sardines	Nov-Feb	All of the coast line	Gill net	Unknown	Bait for setline	0-.51
Anchovies	Nov-Feb	All of the coast line	Gill net	Unknown	Consumption, Bait for setline	0.5-3.0
Anchovies	Jul-Aug	Bahía de Jiquilisco	Scoop net (encircling net)	>36 tons	Dried	3.0-11.0 (price of dried fish)

Testing of new fishing methods

A small purse seine net with fish attracting light was introduced to capture smaller pelagic fish species while trials were made to improve the gill net preventing accidental captures. As for conger eels, the current methods render large volumes of catch and no trials were planned.

Development of methods for processing fisheries resources

Meat for pupusa, fish hamburgers, and fried fish cakes utilizing tuna and skip jacks were developed. Fish processing training was carried out for participants (restaurant chefs, fish processors, and others) in the processing room of a fish processor.

After the demonstration, the impressions of the participants were taken, and the majority of them liked the products. After six months of fish process training, a survey was conducted of the participants of the training program. However, no-one was able to process the fisheries products because of problems related to acquiring raw materials.

Promotion of processed fisheries products

Based on the results, a methodology for promoting and marketing the selected products was studied and implemented. First experimental sales and promotions of fish pupusas were implemented and as a result, 211 fish pupusas were sold (5% of total sales) during the second day of promotions in a sample tasting of 8 pupuserías (outlets) in Olocuilta. According to polls performed on 61 customers leaving the restaurants, 83% knew about the fish pupusas. 31% of them learned about the fish pupusas because they were offered it at the outlet, 20% had read about them through posters, 18% had been told about them, 12% learned through banners, 8% through table signs, 6% through TV and 6% through newspapers. .

(4) Project for Increasing Women's income in Fishing Communities

The income of families in fishing communities of El Salvador is falling due to the smaller catch. Women in fishing communities do not have access to employment opportunities, and these circumstances prevent women from participating in economic activities. Also, the reduction of the catch has increased living difficulties for these families. In some communities, women have formed groups, particularly those in need of income to sustain their household economies, and that are seeking to develop self-sustainable economic activities to increase family income.

The objective of this pilot project was to achieve the economic independence and development of women by directly supporting the groups of women in the fishing communities that are still in an

emerging phase. The Project was carried out under with the aim of awakening the initiative and awareness of women's autonomy by applying the participative methodology and achieving a greater effectiveness with the least amount of outside investment.

At first, activities were defined through 2 workshops in which women participated enthusiastically, mainly members of the cooperative "Las Gaviotas". Then, the "Strengthening of Eatery and Ambulatory Food Stands for Tourists" Project was chosen because of the high potential to be developed in a short time. At the beginning, they tried to improve income and control expenses through accounting. Some members did not like or could not keep accounting at first, since they were not used to it. However, after a few days they learned how to keep the books and understood the importance of record keeping. Training on how to operate the eatery was also implemented as well as on how to calculate expenses, and efficient purchase plans for materials, etc. were made with the deadline set as Independence Day (September 15, 2001), a date on which a large number of tourists was expected. The work system was revised in late October and the rotation system was changed to two permanent people. Up to now (March 2002), fixed salary payments were made to all those in charge of the eatery.

With the purpose of diversifying the menu of the eatery, training on how to process fish was conducted. After the training, an experimental processing and sampling tasting of the products elaborated with the initiative of the members, was carried out. In order to exchange with a different group of women, training was held again with the group of San Antonio Los Blancos. During the training, the women acted as trainers using the fish croquette recipe. At the same time they received training on how to prepare fish pupusas.

Workshops were held in 4 selected communities, and it was determined that San Antonio Los Blancos and Los Cóbanos were the target groups for the Project. A workshop for the formulation of the Project was held in San Antonio Los Blancos. Through this workshop the establishment of a restaurant was planned with tourists in mind as target clients. The women's committee did not have any funds to obtain the necessary equipment, so it was decided to first start fund raising activities such as selling sodas and food. It was then that the two groups that were formed for this task implemented payment and work shift systems. A surprise gift was also raffled off as part of the activities that raised funds - though not a substantial amount - for the gradual acquisition of the necessary equipment.

Also, training was conducted on fish processing in Isla de Méndez. The restaurant started out with help from the cooperative and their family members, having little profit at the beginning.

However, in July 2002 it became an important source of income for the members of the cooperative.

In addition to the activities mentioned above, many other diverse activities were carried out such as participating in awareness events, flea markets, and the processing and selling of processed fishery products. As a result, it has been shown that there is a possibility of increasing the income of women in fishing communities in El Salvador through these kinds of economic activities.

4. Artisanal fisheries development plan

(1) Principle

The fishery sector in El Salvador is going through extreme difficulties regardless of industrial shrimp fisheries or artisanal fisheries. However, even under these conditions, the Study indicates that it is possible to find a solution to the crisis if effective strategies are executed. Such strategies include the following: utilization of under-utilized resources, installation of artificial reefs, creation of approaches to process fish products, establishment of cultivation techniques, introduction of fisheries management, strengthening fisher organizations and women organizations that carry out fishery activities, and creation of a dialogue between industrial and artisanal fishers. The pilot projects implemented during this Study have indicated that current conditions in El Salvador can be improved.

For the execution of these strategies and policies, it is indispensable for strong initiatives from the government to overcome the crisis and strengthen CENDEPESCA. It is important in this process to elaborate clear and realistic strategies of development, abandoning the posture of attempting to benefit everybody and be conscious of the human resources and financial limitations of the institution. Therefore, the Master Plan should be formulated following the below basic rules.

1. Develop a plan that although may be difficult to carry out, is feasible.
2. Concentrate on designing a fisheries management system that can serve as a basis for artisanal fisheries.
3. Aim at establishing a co-management system between government and the local people.
4. Form broad artisanal fisher organizations to establish a strong co-management system.
5. Simultaneously, strengthen the organization of fisheries development facilities, which are necessary to create the cooperative management system.
6. Implement several projects collaterally as a package, such as: utilization of untouched/undeveloped resources, improvement of women’s livelihood in the fishing

community, shellfish aquaculture, consolidation of infrastructure, etc to strengthen the cooperative management scheme.

7. Prepare details of each sub-sector development plan separately based on the overall master plan.
8. After partial implementation of cooperative management in artisanal fisheries, promote discussions between fishers and fishing industries to encourage cooperative management also in the industrial sector.

(2) General framework

The chart below describes the general framework of the Artisanal Fisheries Development Plan in El Salvador. The present Plan consists of three phases. The right-hand column represents the division of these three phases while the left-hand column represents the Development Plan itself. The lowest portion of the image began to take place in the year 2000 and phase II is expected to conclude in 2010. As 2002, phase I was into its second stage.

The parts of the column that correspond to Phases I and II are represented in pink and blue. The pink section represents the activities that are strongly related to CENDEPESCA, while the blue section represents artisanal fishers. It can be observed that establishment the co-management system requires cooperation between both of these big role players. The four thin columns in brown of Phase II represent the lateral support projects that will strongly sustain the central axis of co-management. Furthermore, the eight thin brown columns located in the upper part of the model, which correspond to Phase III, represent some examples of the sub-sectorial development projects that lie on the basis of co-management development. In other words, the basic concept of this Plan consists of coping with the sustainable development of artisanal fisheries through the various development projects that are based on a solid foundation called “co-management”.

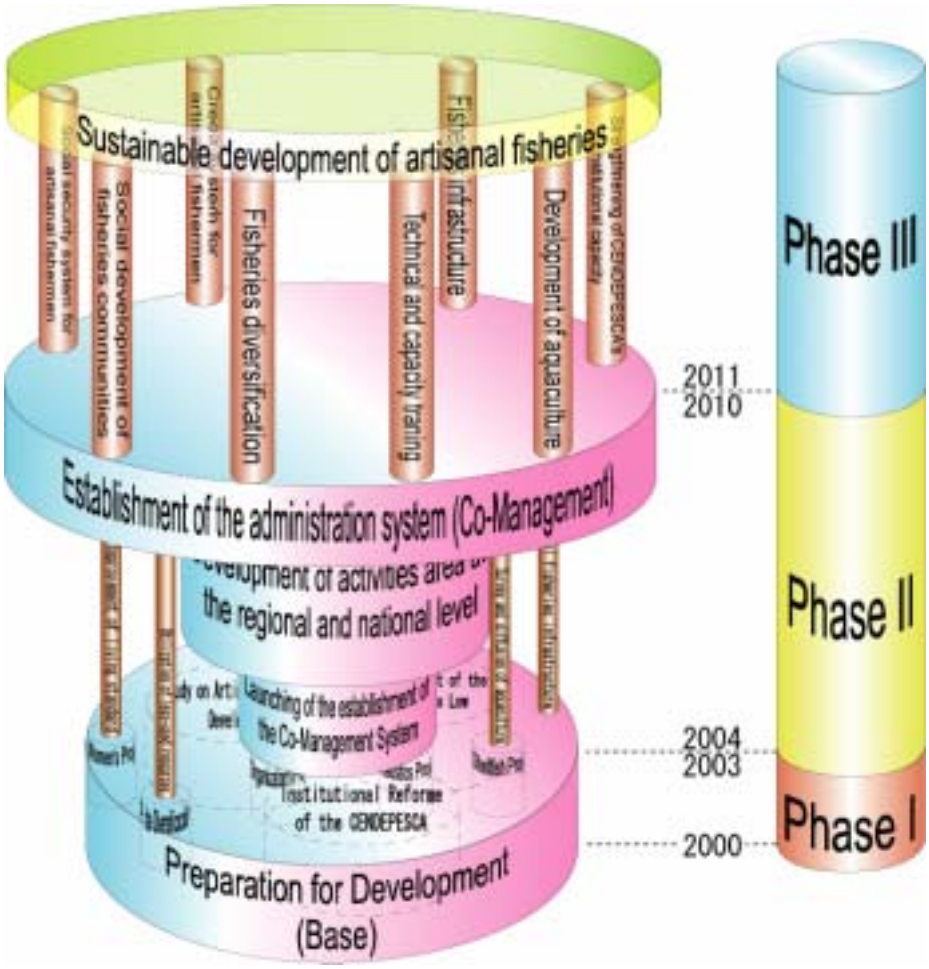


Image of the General Development Plan

(3) Concrete scenario

Since it is most important for the implementation of co-management, Phase II is divided into three stages: initial, intermediate and final. Regarding this conceptualization, the following table summarizes the specific profile of the development plan following a temporary sequence: starting with Phase I, Phase II –initial stage, intermediate stage, final stage and Phase III. As it can be seen in the following table, a concrete scenario of the fisheries management development has been elaborated on, which is the center of the development plan, with fisheries resources broken down into 4 components: 1) demersal fish, 2) pelagic fish, 3) shrimp, and 4) mollusks.

Fisheries management development outline

	Demersal fish	Pelagic fish	Shrimp	Shellfish
Phase I	Continue pilot project (installation of artificial reefs)	Continue pilot project (improvement of fishing gear and methods)	Initial implementation of protected areas and closed seasons (main executor: public sector)	Research through Technical Cooperation such as the JICA Project
Phase II – initial stage	Continue pilot project (monitoring of artificial reef impact)	Revise development potential or resources and research on shark resources	Expansion of protected areas and closed seasons	Expansion of protected areas + farming model (Main Executor: public sector)
Phase II – intermediate stage	Expansion of artificial reefs throughout the country	Drafting of fisheries management plan	Shrimp fisheries optimization study	Expansion of protected areas + farming model (Main executor: fishers)
Phase II – final stage	Self-management of fishing zones (surrounding artificial reefs)	Execution of fisheries management plan	Dialogue between artisanal and industrial fishers	Self-management of fishing zones
Phase III	Development towards new fisheries management system			

Phase I

Phase I constitutes the foundation of the present Plan. The foundation is based on the new Fisheries Law enacted in December 2001 that sets forth the legal framework; the reorganization process of CENDEPESCA planned in 2000 and begun in 2001; the execution of the present Development Study and pilot projects; JICA research and development of shellfish; and other technical cooperation projects. These activities and projects should not be isolated, but deemed components of the foundation of the present Plan.

Phase II – Initial stage

Some co-management elementary activities based on the foundation built in Phase I will be started in this phase. Elementary co-management activities mean that the three components of fisheries management will be intensified (resources management, fishing zones management and catch control) and will start correlating with one another.

Phase II – Intermediate stage

Under this Phase, the coverage of fisheries management begun in the preceding stage at national and regional levels will be extended. The public sector's initiative will be gradually replaced by the fishers' organization's initiative. The public sector will dedicate more support aiming for a more advanced administration which will include the reduction of shrimp trawling boats, and an integral study on the management of shrimp fishing in general, etc. In general, the volume of activities of each component of the fishery administration will increase.

Phase II – Final stage

The establishment of a co-management system should be completed in the final stage of Phase II. Catch controls including the management of protected areas or closed seasons, would have been implemented with the collaboration of fishers and CENDEPESCA. Fisheries management coverage regarding the construction of artificial reefs will also be increased at the municipal and national level, thus putting into place a strong co-management system.

Phase III

Phase III corresponds to the phase where the sustainable development of artisanal fisheries takes place in different fields based on the co-management system established through the national network of fisher organizations and CENDEPESCA. This means that fisheries management at this stage is based on close coordination among the three components: resources management, fishing zones management and catch control.

In this Phase it is expected that CENDEPESCA would have acquired sufficient organizational capacity to execute different multilateral strategies required for sustainable development of artisanal fishers, including the financing system, fishing society development, technical assistance of different types, aquacultural development, etc. Furthermore, it is expected that the National fishers' federation will assume not only fisheries management, but that it will become a true institutional basis for the multilateral development of artisanal fisheries. The eight columns shown in the figure above continue to be only examples of the specific projects for artisanal fisheries development. It is going to be necessary to plan specifically which projects will be implemented, where and what investments will be made with which program and what the magnitude will be. At this moment, it is still too early to establish a concrete image of what could be made at that time.

MASTER PLAN STUDY ON ARTISANAL FISHERIES DEVELOPMENT IN THE REPUBLIC OF EL SALVADOR
MAIN REPORT

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Exchange Rate

US$1=¢8.74	January 1 2001
	As of July 2002, the dollar and the colón are used in parallel

Abbreviation

¢	Colón
ADESCOS	Association of Communal Development
ASDEC	Salvadoran Association of Peasants Development
CCN-PESCA	National Scientific Committee of Fisheries and Aquaculture
CENDEPESCA	Fisheries and Aquaculture Development Center
CONAPESCA	National Committee of Fisheries and Aquaculture
CRB	Central Reserve Bank
DIDECO	Dirección de Desarrollo Comunal
EU	European Union
FACOPADES	Artisanal Fishermen Cooperative Federation of El Salvador
FAO	Food and Agriculture Organization
FECOPAZ	Fisheries Cooperatives Federation of La Paz Department
FIAES	Initiative Fund for the Americas El Salvador
FONAES	National Fund for the Assistance of Private Enterprises
GDP	Gross Domestic Products
HACCP	Hazard Analysis and Critical Control Point
IDB	Inter-American Development Bank
IMF	International Monetary Fund
ISDEMU	Salvadoran Institute for the Development of Women
JICA	Japan International Cooperation Agency
lb	Pound （1Kg ＝ 2.2 pound）
MAG	Ministry of Agriculture and Livestock
MIREX	Ministry of foreign Affairs
NGO	Non-Governmental Organization
OLDEPESCA	Latin American Organization for the Development of Fisheries
PRADEPESCA	Regional Program to Support the Development of Fisheries in the Central American Isthmus
REDES	Salvadoran Foundation for Reconstruction and Development
RRA	Rapid Rural Assessment
SICA	System of Central American Integration
UNDP	United Nations Development Programme

Part I Current Situation

Chapter 1 Introduction

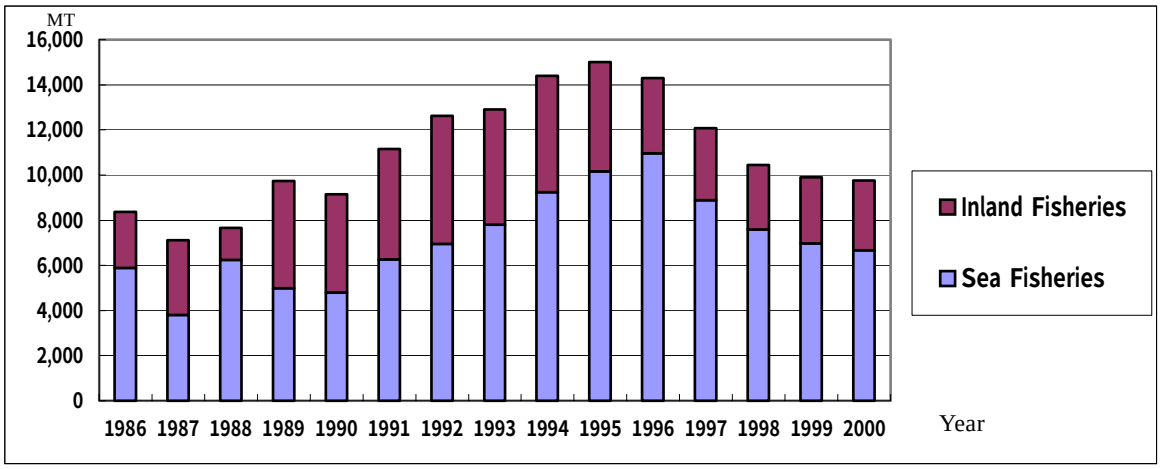
1.1 Profile of the Present Study

1.1.1 Background

The fisheries sector of El Salvador is divided into three large categories: industrial shrimp trawling for export purposes; artisanal fisheries[1] in inshore or in estuaries with products mostly marketed in the local market; and artisanal fisheries in inland waters such as lakes and lagoons. In addition to the above, aquaculture (tilapia and shrimp farming) is also practiced, even though at very low levels and is generally little developed in terms of commercialization. Regarding the fish product processing sub-sector, with the exception of shrimp exports, the only processing carried out is fish drying (and salt bath) by the fishers themselves or middlemen, and the manufacture of ice on a small scale. The fisheries sector represents a small percentage of the national economy: only 0.4% of the GDP and 3.9% of the agricultural sector GDP. However, it is a very important sector from the perspective of the acquisition of foreign currency through exports and employment.

According to the statistics of the Fisheries and Aquaculture Development Center (CENDEPESCA) of MAG, the total Salvadoran catch experienced a growth from 8,362 MT (1986) to a maximum of 14,999 MT (1995). However, this figure went down to 9,755 MT in 2000. From the total catch of 9,755 MT, 6,665 MT correspond to sea fisheries out of which 2,099 MT (32%) correspond to industrial fisheries and 4,566 MT (68%) to artisanal fisheries. The decrease in the catch in the past few years is due in part to the impact of Hurricane Mitch (1998) and to the deterioration of the fisheries ground environment. However, the pressure of overexploitation that is gradually affecting the coastal resources availability cannot be ignored either.

[1] Article 6 of the new Fisheries Law defines artisanal fisheries as an extraction activity that is carried out through means where manual labor prevails, utilizing boats no longer than 10m in length and in which for its movement manual effort or minor equipment is utilized. The content of this report is developed along this definition.



Source: Fishery and Aquaculture Statistics 2000

Figure 1-1 History of Fisheries Production in El Salvador

Up to now, it was believed that trawling of shrimp with high commercial value for export purposes was the main product of the Salvadoran fisheries sector. However, this catch has shown a decreasing trend in past years to the extent that it is deemed that more than half of the 90 existing ships are not operating. This situation is becoming worse as years go by. This fact constitutes an adverse factor for the national economy since shrimp had been an important export item.

After the earthquakes of January 2001, the declining trend of the catch of inshore artisanal fisheries (this sub-sector absorbs a total of 13,000 fishers)[2] was accelerated. The drastic reduction of the catch is a common phenomenon seen throughout the country and there is a growing sense of crisis among fishers. Artisanal fisheries were already underdeveloped concerning technology and management measures, product processing and organization of fishers that translated into low productivity. However, the deterioration of profitability in the last one or two years has reached a critical level.

Inland water fishery is only artisanal and mainly targets tilapia in lakes. Even so, this sub-sector is significant since it represents one fourth of the total national catch. Notwithstanding the catch also experienced a temporary increase between 1986 and mid-nineties, from 1,816 MT to a maximum of 4,000-5,000 MT, it has followed a decreasing trend similar to sea fisheries, which catch halved for 1999 (2,653 MT).

Until now, it was deemed that the annual per capita consumption of fishery products was very low, some 2.4 kg according to the document prepared by the Government of El Salvador to request this Study. However, it seems that there is a large discrepancy between statistics and

[2] PRADEPESCA, 1996.

reality that will be addressed in more detail in Chapter 6, which the present study has estimated as a minimum of 7.0 kg. In any case, this does not change the fact that the regular supply of fishery products and the spreading of fish eating habits, mainly among members of the low income class, is a priority for the Government which should consider that the fishery sector has a more significant role than just providing foreign currency through exports, that is, a social role.

On the other hand, the rescue of artisanal fishers from poverty is one of the social tasks that the Government must assume. In addition to low productivity and social services deficiency in the fisheries communities, there has been an increase of artisanal fishers due to migration to the coastal strips of refugees escaping from the conflict that affected the country in the years 1979-1992. It is also one of the causes of poverty that persists in the coastal fisheries communities. It is common to find families living on remittances sent from relatives who have emigrated to the United States in search for work. Moreover, the earthquake occurred in January 2001 widely affected the population of these communities.

Fisheries management is under the jurisdiction of the CENDEPESCA of MAG. The National Basic Fisheries and Aquaculture Policy,[3] which is the basic document for fisheries development, was drafted in August 2000. In addition, the New General Law of Organization and Promotion of Fisheries and Aquaculture subject to the philosophy already explained was put into effect in December 2001.

The above-mentioned national policy has the following three objectives:

① To take advantage of fisheries resources in a sustainable way and ensure sustainability for future generations.
② To modernize and systematize new institutionalized regulations in the sector that allows for an adequate management of fisheries resources.
③ To promote the use of new alternative resources guaranteeing profitability and competitiveness in economic, social and environmental terms.

Within this context, the present Study has been developed to provide support to the Fisheries and Aquaculture Development Center (CENDEPESCA) and to prepare a Master Plan aimed at the comprehensive development of artisanal fisheries not only to procure foreign currency through exports of fishery products but also to increase employment opportunities, mitigate poverty in the coastal strips, and promote fish consumption in order to increase the rate of self-sufficiency in food. Once the request from the Government of El Salvador was received, JICA sent a team to conduct a preliminary study in November 1999. This team arrived to conclude the Scope of the Work (S/W). In September 2000, JICA sent the Study Team of

[3] The translated version of this document in Japanese can be found in the annex.

Phase 1 of the Study on the Development of Artisanal Fishery, which conducted pertinent activities on the Study. In September 2001, for the second time, JICA sent the Study Team to execute Phase 2 of the Study, in which activities were carried out, especially the pilot projects. The present report complements the Master Plan integrating the Draft Final Report (1) with the results of the pilot projects.

1.1.2 Objectives of the Study

The objective of the present Study was to prepare the Master Plan for the Comprehensive Development of Artisanal Fisheries in El Salvador. Furthermore, it is intended to transfer the technology on the study methodology, procedures and planning approach to the counterpart personnel (C/P) of CENDEPESCA and to other people involved while the study is in progress and through workshops.

Additionally, based on the new proposal made by the Government of El Salvador at the beginning of the Study, it was basically agreed to implement pilot projects selected from the list of development projects proposed in the Draft Final Report (1). The selection of the projects will be subject to a series of criteria including the importance of the expected results, and will be implemented on an experimental basis in order to verify their viability.

CENDEPESCA and the Study Team agreed to propose the following 4 pilot projects in a meeting held in March 2001. The data and the results of the evaluation obtained from the pilot projects assist in the efficient implementation of the Master Plan presented in this report. In addition, the study was conducted taking into consideration the fact that a practical technology transfer will be useful for the smooth development of the Master Plan.

(1) Fisheries Statistics Improvement Project
(2) Project in Support of the Formation of Fishers' Organizations
(3) Women's Economic Status Improvement Project
(4) Artisanal Fisheries Diversification Project

1.1.3 Basic Guidelines of the Study

The following are the basic guidelines of the present Study.

(Phase 1)

(1) A comprehensive Master Plan is prepared including all the areas directly intervening in artisanal fisheries such as fishing and aquaculture methodology, distribution, processing, organization of fishers, fishing village infrastructure, coastal environment,

fisheries management, etc.

(2) A specific and comprehensive Master Plan is prepared to enable the implementation of the sectorial development strategies set forth by MAG in 2000 in its document "National Basic Fisheries Policy".

(3) The followings are incorporated into the Master Plan as priority challenges: (1) strengthening of the organization of fishers; (2) improvement of the distribution system including middlemen; (3) development of a surveillance system taking into account the current status of fisheries grounds and resources; and (4) improvement of the institutional capacity of CENDEPESCA.

(4) An action plan is prepared for the proposed projects so that the Master Plan does not turn out to be just another document over the table.

(5) As a general rule, the Study covered the 112 fisheries communities scattered in the Salvadoran coastal strip. Of these, the following 14 communities have top priority for pragmatic reasons.

[Western Region]

Ahuachapán	Garita Palmera and Barra de Santiago
Sonsonate	Acajutla and Los Cóbanos
La Libertad:	La Libertad Port
La Paz	San Antonio Los Blancos and San Marcelino (Costa del Sol)

[Eastern Region]

Usulután:	Isla de Méndez, Puerto El Triunfo and Puerto Parada
La Unión:	Isla Zacatillo, Isla Meanguera, Isla Conchaguita and El Tamarindo

(6) The Rapid Rural Appraisal (RRA) is conducted to learn about the current status of the fisheries communities and their organizations and to detect the needs for development. This study intends to cover 40 of the 112 artisanal fisheries communities.

(7) Fisheries communities on sandy beaches facing the open sea west of the Lempa River, fisheries communities located in the east bays and mangroves, and island communities present different natural and social conditions. The Master Plan incorporated the vision of regional development taking into account the local features.

(8) Since a PRADEPESCA study covering the Central American region had already been conducted with the assistance of the EU, information would be gathered from neighbor

countries as well.

(9) Activities will be coordinated not only with MAG, which is the counterpart institution of this Study, but also with other relevant institutions such as the Ministry of Environment and Natural Resources.

(10) Different organizations and entities such as the Central Government, local governments, fisheries cooperatives, private sector, NGOs, community, etc, participate as project executors depending on their nature and profitability. Due importance was given to the dialogue with the possible project executors always taking into account who will be in charge of implementing each project.

(11) The fisheries sector of El Salvador is receiving assistance from JICA experts as advisors. Technical cooperation has recently started with a project for the promotion of mollusk farming. A synergic effect will be sought through a close exchange of information with these experts.

(12) While taking into account the role played by the existing cooperatives (more than 15) and by the Federation of Artisanal Fishers Cooperatives of El Salvador (FACOPADES), attention was also given to the fact that about 95% of artisanal fishers are independent.

(13) Many women living in artisanal fisheries communities are single mothers. Special attention will be given to the strengthening of women in fisheries communities since they are the poorest due to their lack of access to land or to special technology.

(Phase 2)

(1) Incite the initiative and conscience of autonomy of the beneficiaries through participatory methodology.

(2) Create a system of coastal resources management at the administrative and fishers level.

(3) Empowerment of CENDEPESCA's staff

(4) Enhance self-confidence through successful experiences

(5) Verify the potential of the elaboration and commercialization of processed fishery products

(6) Consider women empowerment

(7) Seek the possibility of utilizing functions of other institutions

1.1.4 Members of the Study Team and the Counterparts

(1) Study Team

(Phase 1)

Name	Expertise
YONESAKA, Hiroaki	Team leader and Artisanal Fisheries Promotion
UDAGAWA, Kazuo	Inshore Fisheries Technology
KOBAYASHI, Shigeru	Mariculture Technology
IWASAKI, Shigeru	Fisheries Economy
ALLAHPICHAY, Ibrahim	Distribution and Processing
IKEDA, Takaharu	Fisheries Society
WADA, Yasushi	Organization of Fishers
NAITO, Katsumi	Fisheries Infrastructures
ITO, Tsuyoshi	Environmental Impact
SEKO, Akiya	Fisheries Regulation and Surveillance
TASUNO, Kazuya	Spanish-Japanese Interpreter/Promotion
SUZUKI, Noriaki	Coordination

(Phase 2)

Name	Expertise
YONESAKA, Hiroaki	Team Leader and Artisanal Fisheries Promotion
UDAGAWA, Kazuo	Inshore Fisheries Technology
SEKO, Akiya	Fishery Statistics, Regulations and Surveillance (1)
SUZUKI, Noriaki	Fishery statistics, regulations and surveillance (2)
WADA, Yasushi	Organization of Fishers
SATO, Yuki	Fisheries Society
SHIRAI, Yoshiho	Commercialization and Processing
ITO, Takujiro	Spanish-Japanese Interpreter/Promotion
UMEDA, Arihiro	Coordination

(2) Counterparts

(Phase 1)

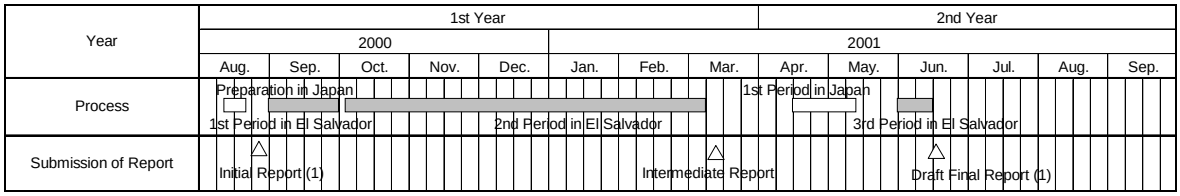
Member of the Study Team	Counterpart (First and Last Name)	Post in CENDEPESCA
YONESAKA, Hiroaki	Mario González Recinos	General Director of CENDEPESCA
UDAGAWA, Kazuo	José Luis Salazar Linares	Technician, Fishery Division
IWASAKI, Shigeru	Anselmo Rederos Arévalo	Manager, Planning Department
ALLAHPICHAY, Ibrahim	Reyna Pacheco de d'Aubuisson	Coordinator, JICA-CENDEPESCA coordination
IKEDA, Takaharu	Marta Edith Funes Orgueta	Technician, Fishery Division
WADA, Yasushi	Cecilia Guadalupe Aguillon Ortíz	Technician, Fishery Division
NAITO, Katsumi	Juan Ulloa	Manager, zone office of El Triunfo Port
SEKO, Akiya	Mario Miltron Umaña	Technician, Fishery Division Manager, Statistic Department

(Phase 2)

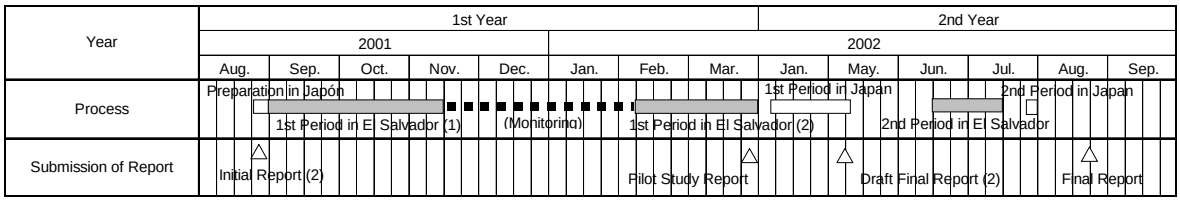
Member of the Study Team	Counterpart (First and Last Name)	Post in CENDEPESCA
YONESAKA, Hiroaki	Mario González Recinos	General Director of CENDEPESCA
UDAGAWA, Kazuo	Orlando Villatoro	Manager, zone office of Acajutla
SEKO, Akiya	Alberto Navarrete	Manager, Statistics Department
SUZUKI, Noriaki	Mario Miltron Umaña	Technician, Statistics Department
WADA, Yasushi	Benjamin Zepeda Orlando Villatoro	Manager, Social Development Department Manager, zone office of Acajutla
SATO, Yuki	Oscar Ulloa Reyna Pacheco de d'Aubuisson	Technician, Social Development Department Coordinator, JICA-CENDEPESCA coordination
SHIRAI, Yoshiho	Juan Gómez	Technician, Statistic Department
ITO, Takujiro	Malta Alfaro	Communication

1.1.5 Evolution of the Study

(Phase 1)



(Phase 2)



In Phase 1, since the Study Team started to work in El Salvador in September 2000, the study has been conducted with relative normality as a result of the support provided not only by CENDEPESCA but also by many fishers and people involved in the sector. Nevertheless, the successive earthquakes of January and February 2001 affected the work schedule. However, we were able to make up for the delay at the end. In Phase 2, 4 pilot projects and complementary studies were implemented immediately and through feedback of the obtained results the Master Plan was elaborated. The main achievements of the Study to date are listed below.

(Phase 1)

(1) The Inception report (1) was prepared (including the technology transfer plan), and the content was discussed and agreed with CENDEPESCA.

(2) The study on the current status of the fisheries communities and fishers' organizations was started at the beginning of October. The results were summarized in the draft of the RRA report.

(3) CENDEPESCA officers attended an organizational analysis workshop held on October 10 and 11 (ID/OS).

(4) The different research activities for the proposed subjects were carried out and the results were timely reported to MAG in progress reports.

(5) The scope of the Master Plan was expanded to include the study of the organizational adjustment of CENDEPESCA advertised in December 2000, and the corresponding study was carried out.

(6) Information on the damage suffered by the fisheries communities was collected immediately after the earthquake of January 2001.

(7) The pilot projects to be implemented after May 2001 were selected and the profile of

each study was analyzed. It was agreed with CENDEPESCA to make a joint pilot project proposal.

(8) The Draft Final Report (1) was prepared based on the results of the studies.

(Phase 2)

(1) Four pilot projects were selected and their contents were determined.

(2) The Preliminary Report (2) was prepared and its contents were discussed and agreed with CENDEPESCA.

(3) Four pilot projects were implemented in September. Particularly, the "Project in Support of the Formation of Fishers' Organizations" and the "Women's Economic Status improvement Project" were formulated taking into account considerations on the participants' autonomy awareness through the implementation of the participatory methodology.

(4) An event took place at the end of October 2001 as an integral part of pilot project activity dissemination. The Ministry of Agriculture and Livestock, the Ambassador of Japan, Navy Force officers, the head of JICA's office in El Salvador, SICA representative were invited, among others.

(5) The new Fisheries Law in effect since December 2001 was examined in order to prepare the Master Plan.

(6) During the execution period of the pilot projects from September 2001 to March 2002, pilot projects were operated in such a way that provided job training to counterparts.

(7) Additional studies were carried out (regarding the content of each study, see the table below).

(8) The Pilot Study Report was prepared in Spanish as well as in Japanese in order to consolidate the results of each project.

(9) Reports on the technical results of the "Diversification of Artisanal Fisheries" were prepared.

(10) The Pilot Study Report (Part II of the present report) and the Small-Scale Fishing Master Plan (Part III of the present report) were added to the revised Final Report Draft (1) and the Final Report Draft (2) was prepared in Spanish as well as in Japanese.

(11) The seminar was held with the objective to inform the concerned parties regarding the outline and the development plan of the Final Draft Report.

(12) The Final Report was prepared.

Priority	Additional Study Item
○	Comparison of the agricultural and fishing societies and agricultural development lessons
○	Measures to overcome the administrative difficulties of the existing fishing cooperatives
○	Ideal outline of FACOPADES organization and activities
○	Report on the present situation of the agricultural cooperatives
◎	Measures to promote the development of new fishing organizations
○	View of the country's regional development strategy
○	Development strategy within the Central American fishing development context
◎	Current situation of fishing product processing plant management and further issues
○	Development of the new processing technology and extension methods
◎	Measures to create the market for the presently underemployed fishing products
◎	Consumption estimate of fishing products per inhabitant
○	Estimate of the current situation of the fishing products trade including transactions not included in the statistics
○	Current situation of shrimp boat operations and damages caused by these fishing gears
○	Scenario of the plan to reduce the shrimp boat fleet
◎	Use of fishing zones
○	Dialogue potential between industrial and small-scale fishers
◎	Debate inside the focus group made up by fishers and the various actors of the fishing society development
○	Current status of the fishing credit and future plans
○	Level of repair of fishing boat engines

◎ Highest priority.

Chapter 2 Socioeconomic Situation of El Salvador

2.1 Social Situation

2.1.1 Geography

The Republic of El Salvador is a small country with an area of 21,041km^2. It is bordered to the south by the Pacific Ocean, to the north and east by Honduras, and to the northwest by Guatemala. It is the only country in Central America that does not have access to the Caribbean Sea. The area at the border with Honduras and the coastal area are crossed by a mountain chain in east-west direction, and the central-western area is crossed by the Apaneca Mountain Range. El Salvador is a country with many volcanoes that is frequently shaken by seismic movements of volcanic origin. On the other hand, the plateau in the center of the coastal area is flat, and constitutes a fertile agricultural area. The Lempa River is the country's longest river. It flows from North to South as if dividing the country in two. There are nearly 150 other rivers in the country that flow into the Pacific Ocean.

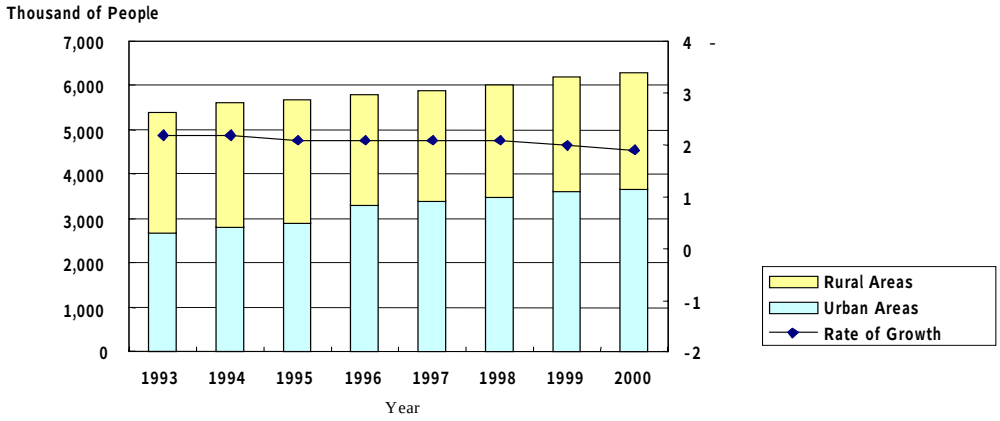
In spite of El Salvador being located at low latitudes (north latitude between 13° and 14°), its climate presents a great variation of temperatures, according to the altitude. The climate in the coast fringe up to 600m above sea level of the Pacific is tropical with average temperatures between 23ºC and 28ºC; in the plateau, between 600 and 1,800m, the average temperature oscillates between 17ºC and 20ºC, and the climate of the mountainous regions of more than 1,800m is cool with temperatures between 10ºC and 17ºC. The year is divided into two seasons, the rainy season (between May and October) and the dry season (between November and April). The average annual rainfall is 1,850mm, whereby 2,292mm falls in rain-abundant areas, and 1,419mm falls in dryer areas. In recent years, drastic changes in the climate have been noticed.

2.1.2 Social Aspects

In 1525, San Salvador was settled by the Spaniards, and later, it became part of the General Captaincy of Guatemala. In 1821, El Salvador declared its independence, and from then on it mostly functioned as an independent nation, except for the years between 1823 and 1841, during which it was part of the United Provinces of Central America. In 1962, the National Conciliation Party (Partido de Conciliación Nacional) gained power. After a coup in 1979, the country entered a period of political conflict lasting 13 years. This lingering chaos ended in 1992 with the signature of the Peace Accord of Chapultepec between the government and the guerilla fighters. In 1994 and in 1999, the first and second post-war presidential elections took place, and in 1999 the second took place. In the latter, Francisco Flores of the Alianza

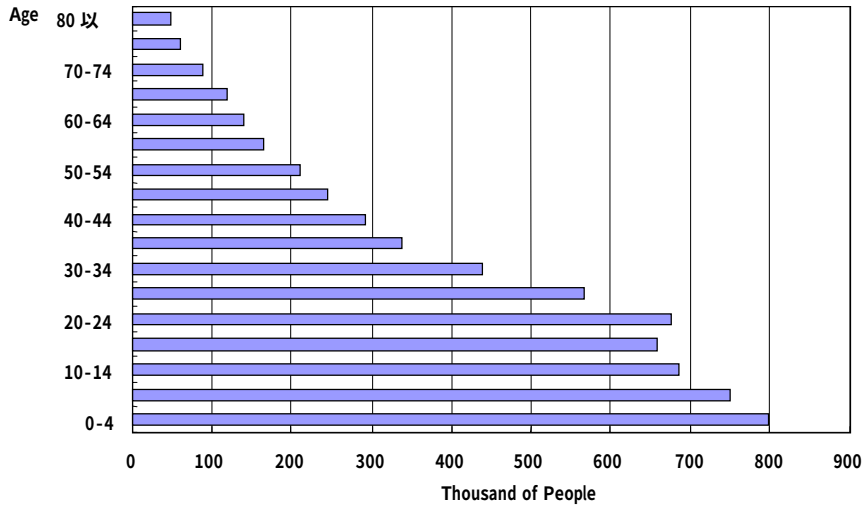
Republicana Nacionalista was chosen as the new President of the Republic.

The total population in recent years in the urban and rural sectors is presented in Figure 2-1. El Salvador stands out among other countries of the region, because of its high population density of 298.3 people / km^2. While rural population growth is stable, urban population is growing fast, thus 60% of the total population dwells in urban areas. In accordance with the population census carried out in 1992, the future population is expected to be 6.9 million in 2005, 7.4 million in 2010, and 9.1 million in 2025. As indicated in Figure 2-2, the age distribution presents a pyramidal profile, and 57% of the total population is represented by people younger than 25 years of age.



Source: Population forecast of El Salvador 1995-2025, General directorate of statistics and census, DIGESTYC 1996.

Figure 2-1 Trends in the Population of El Salvador



Source: Population forecast of El Salvador 1995-2025, General directorate of statistics and census, DIGESTYC 1996.

Figure 2-2 Population Structure According to age

Almost 84% of the Salvadoran population is mestizo. European descendants comprise 10% of the population, 5.6% is comprised by indigenous peoples and 0.4% by others. The mestizo society has completely lost its native language and lifestyle. Indigenous people are distributed mostly in Panchimalco (San Salvador Department), Izalco (Sonsonate Department), Nauizalco (Sonsonate Department) etc. 91% of the population is Catholic.

The country's illiteracy rate for 1998 was 19.5%. This signifies that approximately 88,000 people, 10 years of age and older, do not know how to read and write. The analysis by geographical area shows that urban illiteracy is 11.2%, whereby rural illiteracy is 31.8%. When compared by gender, it is found that women represent the larger percentage of illiterates with 22.0%, while 16.7% of men are illiterate.

2.2 Macroeconomics

El Salvador's government is also implementing a plan for economic stability and a policy for structural adjustment, with the purpose of correcting the macroeconomic imbalance that has been occurring since 1989. This plan also tries to recover the trust in market capacity. The policies implemented from 1989 to 1995 are as follows:

- Maintenance of the monetary austerity policy in order to control inflation
- Liberalization of the exchange rate
- Abolition of the quantitative external commerce restriction
- Great scale tax system reforms
- Reduction of the maximum tax rate
- Almost complete abolition of import tax exoneration
- Abolition of the export laws and of coffee and sugar monopoly
- Strengthening of the financial status of the State Trade Bank, as a precedent step to its privatization
- Abolition of interest rate control
- Monetary restriction by means of the use of diverse indirect methods

These policies have been inherited from preceding governments, and the current government has already carried out taxation system reform through the reduction of maximum tax rates, and the abolition of import tax exoneration. Additionally, not only the State Trade Bank but also other state institutions are in the process of privatization. This process has been concluded for the telephone/communication and power sectors.

Dollarization of the national currency has been the most remarkable policy in the last years. The government tried to implement this measure in 1996, but could not gain approval of the World Bank and therefore, could not implement the policy. However, at the end of 2000, the

measure was implemented by means of a Presidential Ordinance, with the starting exchange rate set at 1 US dollar = 8.75 colones starting from January 1, 2001. By March 2001, even though the colon was still circulating, the dollar had become the basic currency. The dollarization policy implies a strong bond between the Salvadoran society and the United States economy. This is due to El Salvador's 65% of exports to the US, and the remittances of 1.5 million Salvadorans residing in the US, reaching US $1,799 million (2000), equivalent to nearly 15% of its GDP (Newsweek, February 26, 2001).

(1) Gross Domestic Product (GDP)

As presented in Table 2-1, since 1992, the year in which the Peace Accord was signed, the Gross Domestic Product experienced high growth, compared to the 80's when the economy seriously stagnated. The average annual growth until 1999 was 4.1%. The increment of the per capita GDP is 2.0% when adjusted to population growth of 2.06%. It is considered that the structural adjustment policies that began in 1995 have contributed to the restoration of the national economy. Indeed, the rate of GDP growth in 1997 recovered to 4.2%, and later on, in spite of the fact that Hurricane Mitch affected the country in the autumn of 1998, growth rate was sustained at 3.5%. In 1999, the growth rate maintained its level of 3.4%. According to information from the Central Bank of Reserve (CBR), the growth rate of GDP in the first half of 2000 has been low at 1.9%. This is due to a decrease in national demand, while it is expected that growth will level at 2% for the year.[1]

Table 2-1 Gross Domestic Product (GDP)

(Unit: Million US $)

Year	GDP	Rate of growth
1990	4,169.93	4.8%
1991	4,867.91	3.6%
1992	5,696.07	7.5%
1993	6,916.82	7.4%
1994	8,116.45	6.0%
1995	9,500.51	6.4%
1996	10,315.54	1.7%
1997	11,134.54	4.2%
1998	11,989.41	3.5%
1999	12,466.91	3.4%
2000	13,212.60	2.0%

Real GDP between 1995 and 1999 according to industrial sector does not present variations regarding the ratio between sectors, as observed in Table 2-2. This means that there have not been large changes in the economic structure. In 1998, the manufacturing industry represented the largest percentage with 22.6%, which was followed by trade, restaurants and hotels with 19.9% and agriculture, forestry and fisheries with 12.3%. Together these three sectors

[1] For more details on macroeconomics refer to the annex.

represent almost half of the GDP. In the case of the fishing sub-sector, this represents 0.4% of the total, and only 3.9% of the agriculture, forestry and fisheries sector.

Table 2-2 GDP (current prices)

(Unit: Million US $)

	1995		1996		1997		1998		1999 1/	
	Amount	(%)	Amount	(%)	Amount	(%)	Amount	(%)	Amount	(%)
GDP	5,627.2	100.0%	5,723.2	100.0%	5,966.2	100.0%	6,174.0	100.0%	6,334.7	100.0%
a) Agriculture, livestock farming, hunting, forestry and fisheries	763.8	13.6%	773.4	13.5%	776.1	13.0%	762.2	12.3%	812.3	12.8%
01 Coffee	176.5	3.1%	178.9	3.1%	167.5	2.8%	144.5	2.3%	157.3	2.5%.
02 Cotton	-	-	-	-	-	-	-	-	-	-
03 Basic Grains	157.0	2.8%	155.1	2.7%	148.2	2.5%	137.1	2.2%	162.7	2.6%
04 Sugar Cane	32.8	0.6%	35.1	0.6%	43.5	0.7%	50.0	0.8%	48.0	0.8%
05 Other agricultural products	125.4	2.2%	131.2	2.3%	134.5	2.3%	136.6	2.2%	140.7	2.2%
06 Cattle	123.0	2.2%	123.7	2.2%	133.7	2.2%	136.3	2.2%	139.0	2.2%
07 Bees	80.1	1.4%	78.5	1.4%	83.2	1.4%	89.5	1.4%	96.9	1.5%
08 Forest	42.8	0.8%	43.6	0.8%	44.1	0.7%	44.1	0.7%	45.0	0.7%
09 Fisheries	26.2	0.5%	27.3	0.5%	21.3	0.4%	24.1	0.4%	22.7	0.4%
b) Mining	23.8	0.4%	24.0	0.4%	25.6	0.4%	26.9	0.4%	27.7	0.4%
c) Manufacturing	1,190.5	21.2%	1,211.2	21.2%	1,308.0	21.9%	1,394.7	22.6%	1,446.3	22.8%
d) Utilities	30.4	0.5%	35.6	0.6%	37.1	0.6%	39.3	0.6%	40.4	0.6%
e) Construction	208.4	3.7%	214.0	3.7%	227.2	3.8%	243.4	3.9%	248.8	3.9%
f) Commerce, Hotels and Restaurants	1,146.7	20.4%	1,151.5	20.1%	1,184.7	19.9%	1,229.2	19.9%	1,249.6	19.7%
g) Transport, storage, and communication	418.1	7.4%	425.9	7.4%	458.7	7.7%	478.2	7.7%	492.4	7.8%
h) Monetary and insurance	164.9	2.9%	169.4	3.0%	190.8	3.2%	209.5	3.4%	223.1	3.5%
i) Properties and rent	185.5	3.3%	191.6	3.3%	200.0	3.4%	205.6	3.3%	207.0	3.3%
j) Rent of housing	508.3	9.0%	516.9	9.0%	526.2	8.8%	536.7	8.7%	539.4	8.5%
k) Housing, social, individual and family services	310.1	5.5%	311.6	5.4%	321.1	5.4%	327.7	5.3%	330.3	5.2%
l) Administrative services	320.9	5.7%	334.5	5.8%	347.2	5.8%	348.3	5.6%	353.5	5.6%
m) Negative: Amount of bank services participation	142.6	2.5%	153.8	2.7%	175.5	2.9%	190.4	3.1%	202.7	3.2%
n) Positive: Tariffs and IVA(taxes)	498.6	8.9%	517.4	9.0%	539.1	9.0%	562.7	9.1%	566.6	8.9%

Notes: 1 / Exchange rate between 1993 and 1999: US $1 = ¢ 8.75
Source: Central Bank of Reserve of El Salvador (CBR)

(2) Balance of Payments

Main Salvadoran exports are coffee, sugar and shrimp. The total amount of exports in 1999 was US $2,500 millions. Excluding textiles, coffee, sugar and shrimp respectively represent 21%, 4% and 2% of the total amount of exports (US $1,170 millions). These items are susceptible to international rates, and constitute one of the instability factors of the national economy.

Imports are classified into four types: consumer goods, capital goods, intermediary goods (including crude oil) and textiles. In 1999, each item represented 25%, 20%, 32% and 23% respectively of total imports (US $4,080 millions). Most imported goods consist of consumer goods such as food, and half of the capital goods are represented by vehicles and transport machineries. Most of the intermediate goods are primary materials for the manufacturing industry, and also machinery, including crude oil (3% of the total imports).

With respect to imports and exports, the U.S. is by far the most important country of destination as well as origin, representing 63% of exports and 52% of imports (1999), with an unfavorable balance of trade for El Salvador. Guatemala and other Central American countries are a critical part of commercial transactions, representing 25% of the imports and 16% of the exports. Other more important countries are Germany for exports, and Japan and Germany for imports, in this respective order.

Simply stated, El Salvador has a large trade deficit. Since 1998, non-commercial expenses have also turned to a deficit (Table 2-3). Even when the exterior remittance is included, which itself contains a great surplus, the nation's economy has shown negative balances every year, except in 1997. In 1999, the deficit was US $2500 millions, or 2.0% of the nominal GDP. Nevertheless, in El Salvador's case, the amounts of direct investments and loans are high, and even when they compensate the deficit, they leave a great surplus in the payment scale. The increase of the international reserve since 1994 is superior to the foreign debt, and therefore, it is considered that difficulties do not exist for the capital scale balance and for finances. Furthermore, foreign debts at the end of 1999 have represented 22.5% of the GDP, which is reimbursable if the national economy continues growing at a constant rate.

Table 2-3 Balance of Payment

(Unit: Million US $)

Current transactions	**1996**	**1997**	**1998**	**1999**	**2000**
Commercial balance	-1,433.3	-1,323.2	-1,267.4	-1,291.6	-1,120.3
Net services balance	9.8	55.7	-258.6	-190.2	-174.5
Rent balance	0	0	-66.0	-268.1	-212.3
Net transfers	1,256.6	1,363.6	1,508.2	1,497.5	1,305.3
Checking account balance	-167.0	96.1	-83.8	-252.4	-201.8
Capital transactions					
Capital net entrance	331.9	266.5	385.8	456.6	228.6
Differed payments	0.0	0.0	0.0	0.0	0.0
Net international reserves	-164.9	-362.6	-303.2	-204.2	-26.8
Negative sign, increase					
Level of net international reserves	1,099.5	1,462.1	1,765.3	1,969.5	1,996.3

Source: Central Bank of Reserve of El Salvador (CBR)

(3) Public Finances

The central government's revenues totaled US $180 millions (¢ 1,584.37 millions) in 2000, with major sources of income being the IVA (sales tax) (48%), income tax (28%) and tariffs (11%). Expenses totaled approximately US $220 millions (¢ 1,887.50 millions), with a large excess of spending. These excesses are covered mainly by international loans, and if necessary, by the Central Bank of Reserve (CBR) and private national banks.

Table 2-4 Public Finances

(Unit: million US $)

Consolidated Central Government	**1996**	**1997**	**1998**	**1999**	**2000**
Total revenues	152.07	149.90	160.15	161.63	161.65
Total expenditures	176.11	164.31	187.02	192.13	215.71
Deficit (-) Surplus (+)	-24.05	-14.41	-26.87	-30.54	-54.06
Average revenues					
Tributary	125.26	131.30	140.33	145.68	153.58
Income Tax	34.91	36.93	40.15	44.86	48.99
Property Tax	1.15	1.53	1.65	1.55	1.33
Import Tariffs	18.64	16.67	16.66	16.93	16.06
Tax on Consumer Goods	8.26	8.25	7.58	5.87	5.58
Tax on Consumer Services	0.0	0.0	0.0	0.0	0.0
Sales Tax	61.83	67.81	74.25	76.46	81.62
Other taxes	0.46	0.11	0.05	0.01	0.01
Non tributary and others	24.50	15.65	18.16	13.59	16.48

Average expenditures are prioritized to education, public works, national defense and public security, health and social security, which on the whole represent 70% of the total. Only 2% of the budget is dedicated to the development of the agriculture, forestry and fisheries. This is due to the fact that most new projects are implemented through international cooperation. El Salvador only covers personnel expenses, services, fuel, repairs and general expenses for cooperative projects.

(4) Inflation

After 1992 when economic growth had started, consumer prices began to increase. However, inflation rates are indicating a downward turn. As noted in Table 2-5, inflation rates have remained below 8% since 1996, which is low in comparison to other Latin American countries. Consumer prices decreased by 1.0% in 1999, as a result of a good harvest that year. Inflation experienced an increase of 4.3% in the year 2000, compared to the previous year. The Government plans to continue implementing measures to fight inflation.

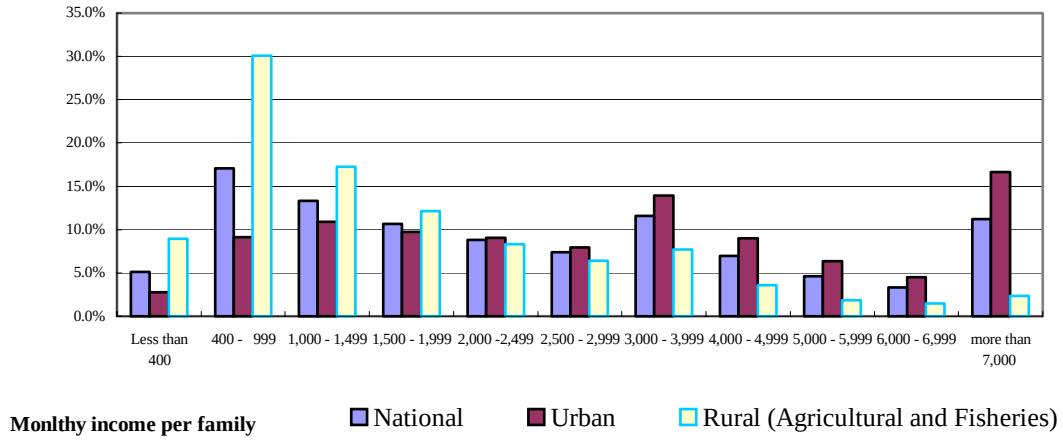
Table 2-5 Consumer Price Index

Consumer December 1992=100	1996	1997	1998	1999	2000
Inflation (%)	7.4	1.9	4.2	-1.0	4.3
Food	11.8	0.4	6.9	-5.2	2.1
Clothes	1.5	0.0	-0.8	-1.5	-0.9
Housing	4.8	4.7	4.6	1.7	9.9
Miscellaneous	5.1	2.4	0.7	3.6	3.4

(5) Employment and Income

The country's population of working age individuals is 4.49 million. Yet only 2.4 million are presently employed, of which 62% are located in urban areas and 38% in rural areas. In recent years there has been a substantial increase in the number of workingwomen. Of the total working age population, 61% are employed fulltime, 31% are underemployed and the rest are unemployed. Unemployment rate is presently 8.2% for men and 5.9% for women. Population under 25 years of age continues to be the group most affected, with unemployment rates at 11.6% and 13.5% in rural and urban areas respectively.

In accordance with the "Survey of Households of Multiple Purposes, 1998", the peak of monthly household income in rural areas is between US $57 and US $114 (¢ 500 and ¢ 1,000), as noted in Figure 2-3. In comparison urban households earn between US $342 and US $457 (¢ 3,000 and ¢ 3,999) monthly. However, urban areas also show a peak in the range between US $114 and US $171 (¢ 1,000 and ¢ 1,500), which reflects the presence of the economically less favored stratum of the rural areas that have immigrated to the urban areas. The constant immigration of the rural population to urban areas is not only caused by the difference of revenues that exists between the two sectors, rather, cities offer the possibility of earning 1.5 times more than rural areas even for people in the less economically favored stratum.



Source: Survey of Households for Multiple Purposes, 1998

Figure 2-3 Distribution of Monthly Family Income

(6) Poverty

Poverty is divided into extreme or absolute poverty and relative poverty. Extreme or absolute poverty is defined as those households that cannot cover the cost of the "basic food basket" for which, in 1998, its monthly value was determined at US $140 (¢ 1,230) for the urban sector and US $103 (¢ 900) for the rural sector, as indicated in Table 2-6. Relative poverty is represented by those households, which do not earn enough to cover double the cost of the "basic food basket". At the country level 19% of the total percentage of households are classified as being in extreme poverty and 26% in relative poverty. In total, approximately 597,000 homes equivalent to 45% of all households live in poverty.

Table 2-6 Income of the Poor Stratum

		Urban		Rural		National
		Criteria	(%)	Criteria	(%)	(%)
Poor Stratum	Households at extreme poverty	US $140 (¢1,230)	12.9%	US $103 (¢900)	28.7%	19%
	Households at relative poverty	US $280 (¢2,460)	23.1%	US $206 (¢1,800)	29.9%	26%
Total			36.0%		58.6%	45%

2.3 National Development Policy

One of the first things that the new government carried out in 1999 was to analyze the national problems with the assistance of about 120 professionals. It then formulated the basic policy “The New Alliance” (Government's 1999-2004 Program). The name, The New Alliance, is the union of the Government's efforts and of the citizens of El Salvador in order to be able to improve the population's life. This will be achieved by means of developing a harmony of balanced macroeconomics, trust and social justice, and economic development in harmony with the environment. The following policies have also been formulated:

- The formation of the great alliance at state level among the Central Government, local governments and the citizenship
- Realistic public measures, which are transparent, efficient and results-oriented
- Greater efficiency in the collection of taxes and use of public resources
- Reconstruction of the budgetary administration system coherent with the financial capacity of the State.

The Ministry of Agriculture and Livestock, in turn, formulated an area specific program “The New Alliance of the MAG for Agriculture, 1999-2004” that intends to carry out the following strategic services:

- Technical investigations and technology transfer
- Incentives for agricultural commercial activities
- Improvement of support infrastructure for productive activities
- Promotion of agricultural education
- Improvement of the fisheries sector and its infrastructure
- Strengthen sanitary control in the agricultural sector
- Social development of the agricultural and fisheries sectors
- Population security and institutionalization of legal land rights

In particular, concerning the fishery sector, the replacing of conventional policy that aimed to increase only production to a new policy of institutionalizing sustainable growth is being promoted. Concrete actions include the operation of loans from the MIB (Multisectoral Investment Bank), implementation of a rigorous control in customs increasing tax revenues, the construction of infrastructure for artisanal fishery, etc.

Box 2-1

Fishers Credit

Agricultural and Livestock Sector Rehabilitation Program (FINSAGRO)

- Objective: To promote the reconstruction of the infrastructure of the fishing sector within a modern environment and to financially sustain the restructuring of the fishing sector and its agro-industry within a framework of higher productivity and sustainability.
- Users: Natural or juridical persons engaged in fishing and aquaculture activities and agro-industrial processes in need to rehabilitate, restructure and/or expand their productive activity in order to improve their competitiveness levels. Services companies (suppliers)
- Source of resources: Financial institutions' own resources providing direct support to the sector in general are also included.
- Maximum credit limit: US $7 million
- Term: Up to 4 years with 1 year grace period
- User's rate of interest: The same that applies to all loans under FINSAGRO.
- Term and grace period:
  1) For studies, technical services, working capital: 4 years (grace period: up to 1 year)
  2) For the purchase of machinery, equipment, boats and fishing gears for aquaculture production: 10 years (grace period: up to 2 years)
  3) For construction and facilities: 15 years (grace period: up to 6 years)

Working capital credit guidelines

- Objective: To finance the maintenance and development of the productive activities of the fishing and aquaculture sector.
- Credit eligibility: Natural or juridical persons engaged in extraction, processing and aquaculture activities authorized by CENDEPESCA.
- Allocation: Working capital for producers and sub-intermediaries (processors/ exporters).
- Source of resources: BMI's and financial institutions' own resources
- Term: Up to 4 years with 1 year grace period
- User's rate:
  1) Up to 1 year 5.75％＋intermediation of the financial system institutions
  2) Up to 3 years 6％＋intermediation to be defined by the banks
  3) Up to 4 years 6.25％＋intermediation of the private banks
- Funding total
  1) Extraction and aquaculture activities: based on 40% of the average exports and local sales of the last 5 years recorded and certified by CENDEPESCA and the Exports Processing Center (Centex).
  2) Processors: based on 5% of the average of processed pounds exports and local sales of the last 5 years recorded and certified by CENDEPESCA and Centex.
  3) Sub-intermediaries (processors / exporters) based on 40% of the average fish product local sales and exports of the last 5 years certified by CENDEPESCA and Centex.
  4) In the event that the working capital includes payment to suppliers, the amount will be estimated based on the monthly averages of the accounts payable during the last 3 years prior to the submission of the request by the interested party.

Chapter 3 Socio-Economic Factor of the Fishing Society

3.1 Fishing Society

3.1.1 Historical Background of the Fishing Society

(1) Brief History of the Fishing Communities

As shown in Table 3-1, the population increase of the fishing communities since 1940, particularly since 1960, is one of the characteristics of their establishment. It coincides with the time when landless farmers drastically increased in the country[1] because of the expansion of coffee plantations. The increase in the number of fishers could be due to the easiness to start in the fisheries business, in comparison to other industrial activities.

From the second half of the seventies to the second half of the eighties, the political conflict became worse in the northern region and brought as a consequence the migration of the population from the interior of the territory to the fishing communities as well as from the northern and eastern region to the western region. It has been reported that in these years from 3,000 to 4,000 people migrated from the interior only to Puerto El Triunfo. Many new communities settled in the islands of the Jiquilisco Bay such as in Pirrayita Island. Besides, the inhabitants of many fishing communities from La Libertad to La Unión, which where the regions where the guerrilla and the army clashed, left the country (for example to the U.S.) in search for peace. At present, the second generation of the migrant population until the eighties is being established. The high fertility index of women is reflected in the high population growth in these fishing communities.[2]

The construction works of the social infrastructure of the fishing communities including roads, electricity, schools, etc., started in the seventies. Their execution was delayed due to the prolonged political violence in the eighties. The signature of the Agreement of Chapultepec in 1992 marked the restart of the construction works of the social infrastructure and many fishing communities were provided with water supply system, health posts and telephone service.

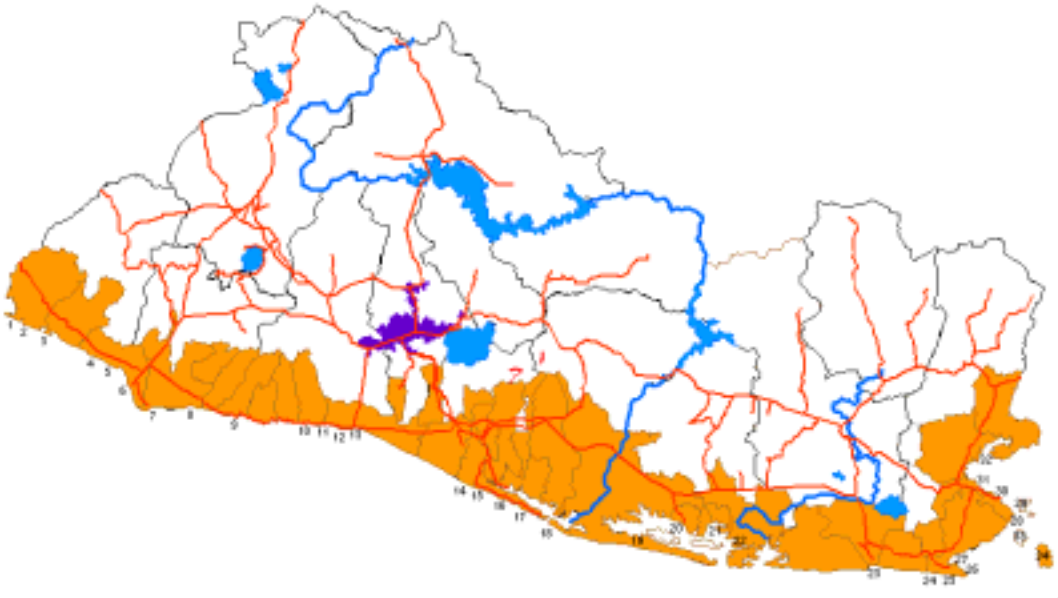
Once the internal conflict came to an end, the NGOs such as Doctors without Frontiers (MSF), CARE, Lutheran Church also started their activities in the social and health field as well as in the environmental field, mainly in the eastern and western regions, as

[1] According to the results of the study, the percentage of landless farmers increased from 11% to 40% from 1969 to 1975. Yoichi Koike, Shouji Nishijima “The Economy of Latin America”, Shinpyoron, 1993.

[2] According to the studies made in 1999, the birthrate representing the average of births for a woman in fertile age is 3.5 in El Salvador, which is the second lowest rate in Central America after Costa Rica. Even though, the level is still high and the Ministry of Health intends to take it down to 3.0.

shown in Tables 3-1 and 3-3. On the other hand, the public institutions engaged in activities to improve the living conditions and income of the fishing communities have aimed their efforts mainly to the central region including La Libertad and La Paz.

Location of Artisanal Fishing Communities



Number	Province	Fishing Communities	Number	Province	Fishing Communities
1	Ahuachapán	Bola de Monte	18		Isla Tasajera
2		Garita Palmera	19	Usulután	Isla de Méndez
3		Barra de Santiago	20		El Triunfo
4		Costa Azúl	21		Isla Pirrayita
5		Metalio	22		Puerto Parada
6	Sonsonate	Acajutla	23	San Miguel	El Cuco
7		Los Cóbanoss	24	La Unión	Playa Torola
8		Barra Salada	25		El Maculis
9		Metayo	26		El Jaguey
10		El Zunsal	27		El Tamarindo
11	La Libertad	El Majahual	28		Playitas
12		Los Filtros	29		Isla de Zacatillo
13		La Libertad	30		La Unión
14	La Paz	Pimental	31		El Guisguil
15		San Marcelino	32		Chapernal
16		Los Blancos	33		Isla Conchaguita
17		Herradura	34		Isla Meanguera

Figure 3-1 Map Showing the Location of the Fishing Communities where the RRA was Conducted

Table 3-1 Classifications of the Fishing Communities by Foundation Period

Foundation	Main Communities	Province	Characteristics
Before 1900	Acajutla La Libertad Herradura El Triunfo La Unión	Sonsonate La Libertad La Paz Usulután La Unión	[Ahuachapán, Sonsonate] • The population started to increase around 1940. • The population which migrated from the eastern region started to increase approximately since 1980 [La Libertad, La Paz] • The population started to increase approximately in 1940. • Tourists and beach houses increased approximately in 1940 but as a result of the intensification of the political conflict the number of visitors decreased. After the nineties, tourists increased again.. • At the beginning of the eighties, great damage occurred with the intensification of the political conflict. Restoration started approximately in 1985 and thus started the immigrant population from the eastern and northern region of the country. [Usulután] • The immigrant population from the eastern region started to increase since 1980 as a result of the political conflict. Navigation ways were opened in mangrove forests. • The fishing communities of the mangrove forests were isolated as a result of the intensification of the political conflict. [La Unión] • Far away islands of the Gulf of Fonseca had been originally intended for sending criminals away. The settlement of communities started after 1950. • The population increased particularly after 1980 when the population of the interior migrated as a result of the intensification of the political conflict.
Between 1900 and 1940	Bola de Monte Garita Palmera Barra de Santiago El Majahual Los Blancos Isla Tasajera Isla de Méndez Puerto Parada El Jaguey El Tamarindo El Guisquil Isla Conchaguita Isla de Meanguera	Ahuachapán Ahuachapán Ahuachapán La Libertad La Paz La Paz Usulután Usulután La Unión La Unión La Unión La Unión La Unión	
Between 1940 and 1975	Metalio Los Cóbanoss Barra Salada El Zunsal Metayo San Marcelino Playa Torola El Maculis Playitas Isla de Zacatillo Chapernal	Sonsonate Sonsonate Sonsonate Sonsonate La Libertad La Paz La Unión La Unión La Unión La Unión La Unión	
After 1975	Isla Pirrayita	Usulután	

Source: Results of the RRA conducted by the Study Team

Table 3-2 List of the Main NGOs Working in the Fishing Communities

Scope of the Action	NGO	Activities	Main Communities
NGOs working in specific areas	ACACU	Microcredit	Playa Torola, El Tamarindo, Guisquil
	AMAR	Mangrove Reforestation	Bola de Monte, Barra de Santiago
	AGAPE	Technical assistance in the construction of health centers	Los Cóbanoss
	CARE	Superficial wells (donation of constructions materials)	Isla de Méndez
	CODELMU	Technical assistance in the repair of outboard motors and household economy	Chapernal
	ECOMARINA	Environmental conservation including closed season	Los Cóbanoss
	FONAES	Technical assistance in the installation of "payaos", biological study	Los Cóbanoss
	FUSAL	Technical assistance and increase of compost latrines	Isla de Méndez
	Prince of Luxembourg Foundation	Increase of drinking water tanks (donation of materials), increase of compost latrines (donation of materials)	Playa Torola, El Maculis, El Jaguey
	Maquilishuat Foundation	Increase of compost latrines	El Maculis
	Plan International	Marine turtles hatchery, water supply, electrification	El Majahual
	PROGOLFO	Environmental conservation and eco-tourism	Isla de Zacatillo
	SACDEL	Reforestation	Isla de Méndez
NGOs working throughout the coastal zone	Lutheran Church	Increase of compost latrines (technical assistance in construction), poultry farming techniques, (microcredits, manufacture of coconut oil soap, etc.	Bola de Monte, Majahual
	Doctors without Frontiers	Increase of compost latrines (donation of materials), doctor calls	Bola de Monte, Pimental, Isla de Méndez
	Calpia Foundation	Microcredits	Barra de Santiago, Costa Azúl, Playitas

Source: Results of the RRA conducted by the Study Team

Table 3-3 List of the Main Public Institutions Working to Improve the Living Conditions in the Fishing Communities

Public Institutions	Activities	Main Communities
Secretaria Nacional de la Familia (National Family Secretariat)	Human rights, education, health, women (ISDEMU) and children (ISPM)	Majahual, Isla Tasajera and others
Bank for the Promotion of Agriculture and Livestock	Microcredit and small credit	Barra de Santiago, Los Filtros, La Libertad, Puerto Parada, El Cuco,
DIDECO	Project implementation through organization by ADESCO, control of organizations	Majahual, Isla Conchaguita

Source: Results of the RRA conducted by the Study Team

(2) Brief History of Artisanal Fisheries

Table 3-4 shows a brief summary of the history of artisanal fisheries in El Salvador. Before fishing equipment such as Fiber Reinforced Plastic (FRP) boats, outboard motors, etc and gill nets and long line gear were introduced around 1960, most fishers caught fish and mollusks manually with rowing boats. Since the first fisheries cooperative was established in La Unión in 1960, approximately the following ten years can be considered as the preliminary phase of the organization process. Then, between 1978 and 1980, the government, with the assistance of the World Bank and Inter-American Development Bank (IDB), offered financial support to cooperatives for the purchase of fishing gear and boats and for the organization of cooperatives nationwide.

Most organizations founded in this stage stopped their operations within three to four years although there are some that are still operating as of this date. The possible reasons for discontinuation are the following:

- In many instances, the cause was an administrative problem such as embezzlement of funds.
- There was a lack of sufficient preparation on the community's part as they rushed to get organized in order to comply with the mandatory organization requirements of the World Bank, IDB and the Government.
- The rights to use the fishing boats were monopolized by the members, and non-associated fishers or the community have been unable to receive benefits.
- Subsequently, the intensification of the political conflict paralyzed the support provided by the administration and donor institutions.

Table 3-4 Summary of the Artisanal Fisheries' History

Years	Main events	Corresponding communities and dwellings (notes)
Until the 50's	Shrimp fishing started with the arrival of U.S. ships. Inshore fisheries were mainly carried out with hand lines and rowing canoes.	Throughout the coastal zone
1960	The first fisheries cooperative of the country was founded in La Unión (it was closed down in 1985)	Province of La Unión
In the '60's	FRP boats, outboard motors, gill nets and long line were introduced for the first time.	Throughout the coastal zone
By the end of the 60's	The arrival of residual agrochemical products coming from the cotton fields into the mangrove made difficult the extraction of mollusk.	Provinces of La Paz and Usulután
1970	The use of dynamite in fishing was forbidden.	Throughout the coastal zone (Nevertheless, there are still some fishers who continue to use this method in the Bay of Jiquilisco)
From the end of the 60's until the beginning of the 70's	Pioneer artisanal fishers' cooperatives were founded.	[Fishing communities with cooperatives which were founded in this period] Acajutla, La Libertad, Isla de Méndez (men), El Triunfo
1975	Issue of fishing permits to artisanal fishers by CENDEPESCA.	Throughout the coastal zone
Between 1978 and 1980	The organization of cooperatives was promoted with funds from the World Bank, IDB, etc. (two-step loans from the Bank for the Promotion of Agriculture and Livestock) and was extended to the use of outboard motors.	[Fishing communities with cooperatives which were founded in this period] Barra de Santiago, Metalio, Barra Salada, Pimental, San Marcelino, El Tamarindo, Puerto Parada
1979	Damages caused by the Hurricane Fifi.	Throughout the coastal zone
Beginning of the 80's	The organization of the La Paz cooperatives was promoted with the assistance of FAO/UNDP.	[Fishing communities with cooperatives which were founded in this period] Los Blancos, Herradura, Isla Tasajera
Mid 80's	The fishing population increased as a result of the immigration of refugees from the political conflict.	Western Region (Provinces of Ahuachapán and Sonsonate)
Mid 80's	Intensification of shrimp fishing with gill net. Almost all fishers started to use this gear.	Throughout the coastal zone
1988	Damages caused to fisheries by the red tide.	Central Region (Provinces of La Libertad and La Paz)
Beginning of the 90's	Intensification of inshore trawling (within three nautical miles from the coast) by industrial fishing boats.	Throughout the coastal zone
In the 90's	The organization of cooperatives was promoted.	[Fishing communities with cooperatives which were founded in this period] San Marcelino, Isla de Méndez (women), Playa Torola

Between 1995 and 1996	Damages caused to fisheries by the red tide.	Central – Western Region (Provinces of Ahuachapán, Sonsonate, La Libertad and Usulután)
1996	Fishing boats and gear, ice-making machinery, etc. were donated to cooperatives by Japan within the framework of the Non Reimbursable Financial Cooperation.	Acajutla, La Libertad, Los Blancos, Isla de Méndez, El Triunfo, Puerto Parada
1998	After the Hurricane, seawater contamination occurred and great damage was caused to the nets by drift tree trunks.	Throughout the coastal zone
End of the 90's	The organization of cooperatives was promoted.	[Fishing communities with cooperatives which were founded in this period] Los Cóbanos, Barra de Santiago, Isla Pirrayita, El Cuco
2000	The "worst catch" in recent years	Numerous fishing communities throughout the coastal zone

Source: Results of the RRA conducted by the Study Team

Most of the boats that cooperatives acquired many times were transferred to individuals who took on the debts of the cooperatives and most boat owners acquired them at that time. At the beginning of the eighties, many migrants from the high conflict zones moved to the fishing communities in search for peace as it was previously mentioned.

Numerous communities reported that they started perceiving the reduction of the catch at the beginning of the nineties. This situation has become worse as years go by and many fishers throughout the coastal strip reported that the worst catch so far has been that of the year 2000, according to them, because of trawling in the coast also catching juvenile fishes. Moreover, many reported their concern because so far with the exception of Resolution 99 (which limits the number of shrimping boats to 99) sufficient measures have not been taken for the management control against commercial and artisanal fisheries. Nevertheless, there also exists a dilemma since they do not want to establish a closed season and control to protect the resources since most fishers do not have other source of income than fishing.

3.1.2 Social Structure

(1) Administrative Organization

Many fishing communities have recently been established in El Salvador, as mentioned above. There are also numerous communities, traditionally engaged in fishing activities, where the migrants who arrived in the eighties make up most of the population. For this reason, it is uncommon to find villages controlled by one clan. There are some cases like El Jaguey where the new and old inhabitants live in different zones within the community, having an organization integrated by migrants only.

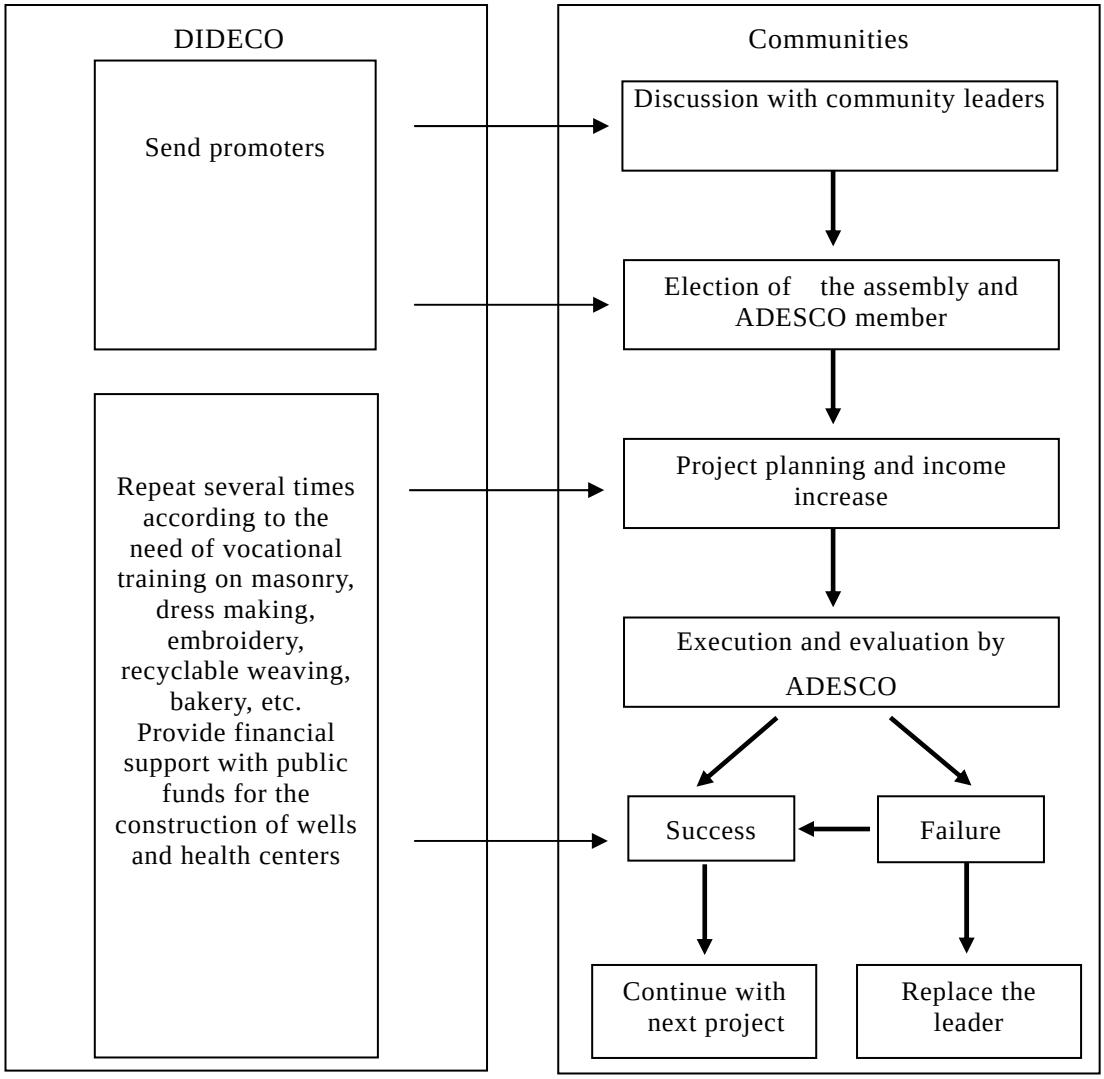
Formally, the municipality constitutes the basic administrative unit and there is no political leader at community level. Some villages have a representative acting as the liaison with public institutions and other villages do not have such representative. Important decisions are made through community meeting while day to day operation decisions are made through a committee organized for each project. The formation of fisheries cooperatives and groups abides by the same procedures. As a matter of reference, box 3-1 shows the case of the Community Development Association (ADESCO) organized by the Ministry of Internal Affairs.

The advantages of this method are that the projects are not executed only by following the opinion of the leaders elected by the group or those people with influence, but more importance is given of the opinion of the people willing to participate. On the other hand, it has the disadvantage that the opinions of the people who do not participate in the community meeting, particularly women, are hardly taken into account.

Box 3-1

Organization of Community Projects: ADESCO Example

The Community Development Division (DIDECO) of the Ministry of Governance (ex-Ministry of Internal Affairs) is promoting community development including income increase through ADESCO, which is an organization of local inhabitants established in each community. The method consists of sending promoters to explain ADESCO's mechanism and provide assistance for the foundation of the organization in each community. The requirement to organize ADESCO is to gather at least 25 families that will give their approval. Technical assistance is provided on thirty issues including dressmaking, embroidery, plastic weaving, etc. At present there are 180 promoters covering the rural and urban marginal zones of the country. Until the end of 2000, ADESCO was established in six thousand communities. Nevertheless, it was deemed that the fisheries cooperatives replaced ADESCO in the fishing communities, and the Ministry of Internal Affairs has not put much effort. Furthermore, the guidelines of the Ministry in directly supporting the communities to work with the municipalities from mid-2001 have changed. As a result, ADESCO will no longer be organized by the initiative of the Ministry.



(2) Families of the Fishing Community

Table 3-5 shows the results of the study on population and family based on data provided by the health posts of each community. According to the RRA, most families have from five to seven members. Most couples cohabit and in some communities, they represent 90%. Generally, men are the decision makers in the family.

Children also participate in the daily economic activities of the fishing communities. In general, children over ten help fishing in canoes or at the arrival or departure of fishing boats and this is the major cause of school desertion. It is also common that children accompany their mothers to collect mollusks, or sell fruit, crabs, turtle eggs, etc.

(3) Gender

Table 3-6 shows the summary of the role performed by men and women in the fishing families. While there is no big difference in gender regarding the activities as ADESCO or ACE members, men take the leading roles in fisheries cooperatives in general. Men make decisions regarding major household expenses while women keep the everyday control. It has been reported that in a certain number of families, the income from the sale of the fish brought by the man is shared by both, himself and his wife on the same day, managing the funds individually according to their needs. Concerning the domestic chores, such as cooking, washing clothes, cleaning, and taking care of the children, it is usually only done by women.

Fishing activities are usually men’s labor although some women fish with estuary. Both men and women extract mollusks. Helps during the boat arrival and departure operations are carried out by young men and occasionally by women. Fish processing (salt bath or drying) are works mostly carried out by women. Particularly, in fishers’ families taking the by-catch of shrimp trawlers, women classify the portion of the catch. On the other hand, men are in charge of repairing boats and outboard motors, and women help repairing nets in some occasions.

Table 3-5 Populations, Number of Families and Members per Family in the Communities

Communities	Population	Families	Members per family
Bola de Monte	1,834	262	7
Garita Palmera	3,409	487	7
Barra de Santiago	4,328	750	6
Costa Azúl	995	200	5
Metalio	936	162	6
Acajutla*[1)]	(28,032) (40,000)	(No data) (8,000)	(No data) (5)
Los Cóbanos*[1)]	(1,971) (3,000)	(No data) (750)	(No data) (4)
Barra Salada	400	60	7
Metayo	1,466	200	7
El Zunsal	1,141	125	9
Majahual	3,482	488	7
Los Filtros	1,026	171	6
La Libertad	14,600	8,000	2
Pimental	1,200	200	6
San Marcelino	1,168	244	5
Los Blancos	1,050	150	7
Herradura	70,000	20,000	4
Isla Tasajera	938	218	4
Isla de Méndez	3,017	431	7
El Triunfo	20,000	4,000	5
Isla Pirrayita	1,125	240	5
Puerto Parada	670	134	5
El Cuco	2,067	344	6
Playa Torola	850	170	5
El Maculis	739	105	7
El Jaguey	3,800	500	8
El Tamarindo	4,000	800	5
Playitas	420	60	7
Isla de Zacatillo	3,750	750	5
La Unión	1,983	744	3
El Guisguil	9,450	1,350	7
Chapernal	500	75	7
Isla Conchaguita	960	160	6
Isla Meanguera	4,114	800	5

Observations: *1) Since it was only possible to obtain data on the population at the health centers, data obtained from the mayoralty were utilized. The numbers on the first row are from health centers and the bottom ones are from mayoralties.

Source: Results of the RRA conducted by the Study Team. The data provided by the health centers covering the corresponding communities were used to obtain the total of the population and the number of families. However, some health centers only have estimates of the communities while others have data that is more accurate as these are obtained through home visits, thus the reliability of the data is limited. Consequently, these data could be used only as a reference

Table 3-6 Labor Divisions in Fishing Families by Gender

Field	Activities	Man	Woman
Community Activities	ADESCO activities	A	A
	ACE activities	A	A
Collective activities associated with fishing	Cooperative leadership	A	R
	Cooperative office work	A	A
	Crane operation	A	R
	Ice making machinery maintenance	A	R
	Sale of ice	A	R
	Sale of gas	A	R
Fishing	Vessel operation	A	R
	Net fishing	A	R
	Hand lines	A	R
	Cast net	A	S
	Mollusk extraction	S	A
	Boat arrival and sailing auxiliary works	A	S
	Processing (fish head removal, cleaning and drying)	S	A
	Freezing and storage	A	A
	Net repair	A	R
	Boat repair	A	R
	Outboard motor repair	A	R
	Bait extraction	A	A
Marketing	Fish and mollusk collection	A	A
	Purchase of catch from fishers	A	A
	Middleman negotiations	A	A
	Transportation (bus, etc.)	R	A
	Sale (in local quarters)	R	A
	Sale of fish and turtle eggs (to tourists)	A	A
Aquaculture	Shrimp farm maintenance (Example: El Triunfo)	A	R
	“Curil” farming (Example: Isla de Méndez, Barra de Santiago)	S	A
Family economy	Decision making on the expenses	A	S
	Control of family economy	S	A
	Savings (including home savings)	A	A
Household chores	Water collection	S	A
	Cooking	R	A
	Laundry	R	A
	Child rearing	S	A
House repair	Carpentry	A	R
	Masonry	A	R
	Electricity	A	R
Religious activities	Church attendance	A	A
Secondary economic activity	Outboard motor repair	A	R
	Farming services rendering	A	S
	Poultry farming	S	A
	Animal husbandry	S	A
	Dress making	R	A
	Bakery and bread sale	R	A
	Fruit sale	S	A
	Store management	A	A

A: Always; S: Sometimes or depending on the circumstances; R: Rarely
Source: Results of the RRA conducted by the Team Study

Fisheries product marketing activities are performed indistinctly by men and women. However, transportation of small loads of products by bus or ambulatory work is made exclusively by women. While the aquaculture is rarely practiced in the fishing communities, there are some exceptions. In case of El Triunfo, men take care of shrimp farms. On the other hand, the ark shell (*Anadara spp*.) farming project of Isla de Méndez, Barra de Santiago, are carried out by groups of women.

3.1.3 Social Services

(1) Social Infrastructures

Most fishing communities have electricity with the exception of those located in mangrove forests. Almost all communities with a certain amount of population have elementary schools except for those located in mangrove forests and in the islands of Jiquilisco Bay where children go to the school of the nearby community. The telephone service covers almost all the region with the exception of the east and western border areas and the islands of the Jiquilisco Bay. Nevertheless, families with telephone service are very few and they belong to the middle and upper class.

(2) Education

The main educational problems experienced in the fishing communities, which were detected in the interviews with schoolteachers and mothers, are described below.

1) High Dropout Rate in Elementary School.

The elementary school attendance rate has improved considerably at least after the political conflict. Almost all parents send their children to school, according to the interviews. However, students who complete the six years of elementary school education are less than half in almost all communities and this is due to the particularities of a fishing community such as:

The main reason of elementary school dropout is the economic situation of the families. While education is free, many were of the opinion that they have to spend on uniforms, books and school supplies. Few parents let their girls go to school even though girls are willing to attend. The second most important reason is that many 12 to 14 year old children are registered in third or fourth grade. First of all this is owed to the fact that many of them start school at an advanced age since their parents prefer to do so because they believe that it is too dangerous for a small child to come and go alone particularly if the school is far from home. Secondly, when children reach the age of ten they start missing classes because they have to help with the fishing activities and household chores, and therefore, do not pass the exams. Finally, in many cases children do not complete the six years of elementary

school.

2) The Curriculum is Irrelevant.

One of the reasons why the population deems that school is not attractive is because the education is not practical, according to the opinions collected in the interviews. At least, the present curriculum does not include topics on fisheries or the history of the community. Some educational projects such as EDUCO[3] or Escuela Saludable[4] (Healthy School) are being implemented and their main goal is to improve the school attendance rate and make school education more attractive.

3) There is No Education Aimed at Adults.

Adults currently engaged in fishing activities belong to a generation that did not have sufficient access to elementary school because of the political conflict. Many cooperative employees learned to write and calculate on their own. Therefore, while the demand for elementary education aimed at adults is high, few communities have access to this type of educational programs. Due to these circumstances, more importance should be given in the fishing communities to the rate of elementary school completion (at least the first six years of basic education) and to the literacy rate rather than to the educational index.

(3) Health

Inoculation and other control measures to prevent diseases have also succeeded in providing coverage to the fishing communities after the nineties; nevertheless, the inoculation rate of the basic vaccine has not reached 90% in many communities and therefore the EPI (Immunization Program Expansion) has to be improved. There is great need to control diarrhea, respiratory diseases, dermatological diseases, malaria and other diseases typical of marginal zones and there is still lack of odontological and prenatal care. Particularly in La Paz and Usulután, there is a high incidence of dermatological diseases and parasitism of the reproductive and digestive organs owing to mollusk extraction under unhealthy conditions.

[3] EDUCO: This system consists in organizing the Community Education Association (ACE) in hamlets with difficult access to formal education and the school management and teacher appointment is the duty of the local community members. The Ministry of Education covers didactic materials expenses and teachers' salaries. At the beginning of the nineties, the number of schools increased dramatically and at present there are approximately 1,800 EDUCO schools (2/5 of the total of elementary schools of the country), particularly in marginal areas.

[4] Escuela Saludable: This service involves the strengthening of food and health services in schools in order to increase the school attendance level. This project is managed by several public institutions such as the Ministry of Family (children's welfare), Education (food), Public Health (health care), Agriculture and Livestock (school orchards), etc. In addition to the state budget, the project has the financial support of the World Food Programme, USAID, FANTEL, etc. Until 2000, nearly 3,600 schools, mainly in marginal zones, were included in the Escuela Saludable Project.

Among the communities, there are great differences in the basic health conditions depending on whether they have a health unit. Health promoters are appointed in communities that do not have a health care unit but their main task is to disseminate health education and is not trained to provide medical care.
Access to safe drinking water is top priority concerning environmental health. Most fishing communities do not have water supply service except in urban areas and community dwellers take water from wells for their daily consumption. Health units distribute free chlorine to disinfect the water stored in each household but many families do not use it. Compost latrines (compost is prepared by adding ashes and lime) are distributed only in communities covered by NGOs.

(4) Social Security
Most fishers do not have access to the social security services or to the pension fund. In order to cover risks and contingencies, they request individual loans either to relatives or from boat owners or middlemen, and only a very few are the members of a small assistance mutual fund of the fisheries cooperatives.

3.2 Economy of the Fishing Communities

3.2.1 Occupation in the Fishing Communities

(1) Classification by occupation of the Fishing Community
The fishing communities of the coast are classified into the following 5 categories that are also shown in Figure 3-2 and Table 3-7. The scale of each circle signifies the scale of workers from each occupation

① Urban Fishing Community
② Combination of Fishing and Agriculture
③ Fishing Community Exclusively Engaged in Commerce
④ Combination of Fishing with Fishing Boats and Mollusk Extraction
⑤ Fishing Community Exclusively Engaged in Mollusk Extraction

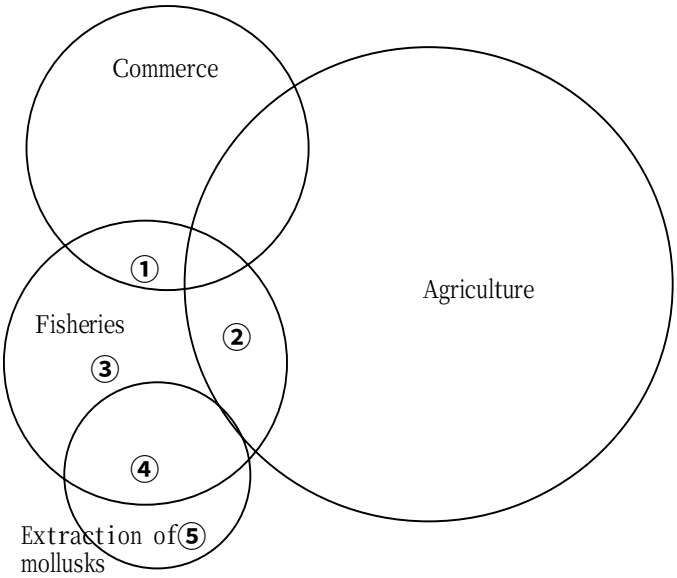


Figure 3-2 Classification by occupation

Table 3-7 Fishing Communities Classification

Type	Characteristics	Main Communities
① Urban	• Predominance of workers in the services and commercial sector than in the fisheries sector.	Acajutla, La Libertad, Herradura, La Unión, etc.
② Combination of fishing and agriculture	• People dedicate to fishing in the agricultural unemployment period.	Bola de Monte, Garita Palmera, Costa Azúl, Metalio, Metayo, El Zunsal, Majahual, Los Filtros, Pimental, El Triunfo, El Jaguey, Isla de Zacatillo, etc.
③ Fishing community exclusively engaged in commerce	• Mainly they dedicate to fishing shrimp and fish.	Los Cóbanoss, San Marcelino, San Antonio Los Blancos, El Cuco, Playa Torola, El Maculis, El Tamarindo, Playitas, Isla Conchaguita, Isla Meanguera, etc.
④ Combination of fishing with fishing boats and mollusk extraction	• Equal number of fishers fishing in boats and fishers mainly engaged in mollusk extraction. • Predominance of women engaged in fishing activities.	Barra de Santiago, Isla Tasajera, Isla de Méndez, Isla Pirrayita, Puerto Parada, El Guisguil,
⑤ Fishing community exclusively engaged in mollusk extraction	• The main occupation is mollusk extraction in mangrove forests.	Small communities inside the Jiquilisco Bay, Chapernal, etc.

Source: Results of the RRA conducted by the Study Team

1) Urban Fishing Community

This is the case that fishing is a part of their urban operations in relatively big cities. They can be equipped or not with fisheries' infrastructures but have all the necessary means to distribute their fisheries products. Surplus labor (mostly

unskilled workers and youngsters) can be absorbed by other activities in the commercial, and services sector, etc.

2) Combination of Fishing and Agriculture

This is the case of communities with an agricultural structure, high birth rate and equal number of fishers and farmers. Normally, the agricultural sector has a high labor surplus rate and the fishing absorption capacity for this type of labor is limited. Nevertheless, during the high season the population engages either in agriculture or in fishing depending on the demand for labor. On the other hand, employment opportunities for women are very few.

3) Fishing Community Exclusively Engaged in Commerce

This is the case that communities where their main activities are to fish and to catch shrimp with fishing boats. The majority concentrates on beaches facing directly the open sea. Most communities located on the coast lacking mangrove forests belong to this category. There are some communities in the western region with mangrove forest where only small fish and crabs can be caught without generating sufficient income for subsistence. There is almost no source of employment which can absorb the surplus labor and these workers only can provide support services to the arrival and departure of boats, net repair, etc. and they receive little cash or payment in kind (fish) in return for their work.

After a detailed investigation of the activities carried out by the community dwellers, this type of community may be subdivided into those engaged in tourism and those that are not. There are tourist and recreational sites on the coast of the Department of La Paz, heading west, and tourist services; beach house housekeeping, etc. are not less significant sources of income.

4) Combination of Fishing with Fishing Boats and Mollusk Extraction

This is the case of the communities where there is a greater number of fishers extracting mollusks from mangrove forests than those catching fish and shrimp in fishing boats. The mollusk catch is made with outboard motor boats relatively big shared by many fishers or with canoes without outboard motor. Men as well as women participate in this activity but the majority are women as these tasks can be performed by single mothers.

5) Community Exclusively Engaged in Mollusk Extraction

This is the case of the communities where there are no other significant economic activities for men as well as for women than the catch of mollusks in mangrove forests or artisanal fisheries in the estuaries. The numerous small communities of

the interior of the Jiquilisco Bay, with little access, and Chapernal of the Fonseca Bay correspond to this category.

(2) Non Fisheries Income

The opportunity to obtain non-fisheries income in fishing communities is little. Nevertheless, some places started eco-tourism projects. Such is the case of the Port of La Libertad that uses boats for tours and eco-tourism in Isla de Zacatillo, Herradura, within the Jiquilisco Bay. Forestry eco-tourism was also started in a community nearby Barra de Santiago. While beach houses and tourist sites were established in the western coast, at present there are no communities offering marine tour services to the tourists or to beach house owners.

(3) Stratification of the Fishing Community

The results of the survey carried out in the fishing communities show that community dwellers can be broadly grouped in the following stratification:

1) Economically privileged class: Owners of farming land worked by tenants, haciendas, administrators of processed shrimp factories or hotels, wholesalers, etc which monthly income is over US $1,000. Most of the fishing communities lack this class.
2) Middle class: Boat owners, middlemen, cooperative leaders, shop and tourist restaurant owners with a monthly income about US $450 correspond to this class.
3) Economically underprivileged class: Employed fishers, mollusk extractors, beach house guards, etc. with a monthly income of nearly US $120 correspond to this class.
4) Extreme poverty class: Single mothers living out of the mollusk catch or ambulatory sales with a monthly income ranging from US $40 to US $70 correspond to this class.

The income gap between classes, particularly between boat owners and employed fishers, is too big.[5] Generally, boat owners, middlemen and their families belong to the middle class while most employed fishers and their families barely survive with their income which is around US $120 and from self-subsistence fisheries (see section of the study on the household economy of the fisheries sector). Many cooperative leaders in communities where this type of organization exists have an income of US $230 that is an intermediate level between the middle class and the economically underprivileged class.

[5] Normally, ship owners supply the gas and fishing gear and the sale of the catch is shared with the crew + 1 (owner) after deducting gas expenses.

Regardless of their income level, there are people with influence in meetings: priests, members of ADESCO and the Community Education Association (ACE). Also patriarchs, teachers and health post personnel are traditionally well regarded. However, teachers and health post personnel in many instances are out of villagers and they leave the community on weekends to visit their hometowns.[6]

3.2.2 Fishing household economy

Shipbuilders and fishers of the representative communities were interviewed in order to obtain the fishers's income and expenses. To this end, the most popular types of activities were selected: gill net fishing (five communities), medium-sized long-liner, small outboard engine long-liner fishing, ark shell (*Anadara spp.)* extraction, and product purchasing (intermediaries). Interviews were made not to random samples but to fishers who kept accounting records in order to obtain real values. The analysis of the fishers' finances was made based on the result of this study and the RRA.

Table 3-8 Income and expenses of longline and gill net shipbuilders
(March 2001 – February 2002)

Fishing Zone	Acajutla①	Acajutla②	Los Blancos	El Cuco	La Libertad	El Espino	La Union
Fishing Gear	Shark longline	Shark Longline	Gill net	Gill net	Gill net	Gill net	Gill net
Fish Specie	Shark, Dorado	Shark, Dorado	Shrimp, Croaker, Mackerel	Shrimp, Croaker, Amberjack	Shrimp, Shark	Shrimp, Morralla	Shrimp
Fish Sales (Unit: US$)	84,435	43,683	6,120	4,733	14,795	4,876	7,964
Catch (Unit: pound)	111,000	39,000	10,168	7,213	13,948	19,174	2,570
Operation cost	32,712	29,184	1,784	943	7,583	2,565	1,857
Balance	51,723	14,499	4,337	3,790	7,212	2,311	6,107
Crew number	5	3	2	2	3	2	2
Shipbuilder's cost	25,862	8,699	2,891	2,527	1,803	1,541	4,072
Repairing cost	17,954	6,707	1,120	745	646	740	773
Annual cost	7,908	1,992	1,771	1,782	1,157	801	3,299
Living cost	5,484	3,156	2,748	2,472	2,460	1,714	3,840
Total balance	2,424	-1,164	-977	-690	-1,303	-913	-541

Source: Results of the interviews made by the Study Team

(1) Size of Fishing Boats

Acajutla ① 200 HP (horse power) engine, 40 feet small fishing boats. Acajutla ② 25 feet FRP boats with big outboard engines operating off-shore. Other gill net boats are 20 feet, which is the predominant size, having 25 to 40 HP outboard engines operating in the coast.

[6] The main task of the health promoters, who are the liaison between the local community and the public health service, is to provide publich health education and dissemination activities.

(2) Fish product breakdown

Most shark long-liners catch the shark. They also catch mahi-mahi (*Coryphaena.hippurus*) in fewer amounts from September to November. Gill net fishing is used to catch shrimp 70% of the time (except in El Espino) and white meat fish such as croakers, mackerel as well as red snapper, catfish, small shrimp, etc. Shrimp percentage is reduced to 20% in La Libertad. White meat fish, sharks are also marketed here. In La Unión, shellfish were extracted to compensate for the reduction in the fish catch in January and February.

(3) Expenses breakdown

Food represents nearly 60% of the total expenses followed by the cost of energy (including firewood), which is 10%. The rest is made up by health and education expenses, which are similar, clothes and medical expenses. In the fishing communities of the urban areas, some families invest a high percentage in house rental.

(4) Shipbuilder's income and expenses

Shipbuilders have to pay for the purchase and repair of their fishing gear, and for the maintenance and repair of engines and boats. In Acajutla, for ① and ② which are engaged in deep-sea shark fishing, the sale and operating costs are 10 to 20 times higher than those of other boats and this is not part of the regular scheme of the small-scale fishing. Annual household expenses are also higher. Notwithstanding the above, a surplus is registered in Acajutla ①, but this is not so in the rest of the cases where shipbuilders cannot live without the proceeds from secondary sources (non-fishing source) or loans from relatives or intermediaries. In fact, it is reported that many shipbuilders do not have the means to buy fuel. The situation became worse particularly in 2001 due to the reduction of the catch.

(5) Fishers' income and expenses

The distribution of the shark catch is peculiar. Normally, shipbuilders provide the fuel and fishing gear. The operating costs are deducted from the sales and the balance is distributed among the crew plus one (shipbuilder's profit). The crew fishers' income, based on simple calculation is: US $1,446, US $1,263, US $1,803, US $2,036 and US $770, and the monthly income ranges from US $64 to US $170. The relative poverty line in the rural and fishing zone of El Salvador is defined in approximately US $206; the absolute poverty line is of US $103. Therefore, it can be concluded that the living conditions of the crew fishers are extremely difficult.

(6) Shellfish extractor's income and expenses

Shellfish extractors of El Triunfo report that they work almost every day and extract about 2,700 units of ark shell per month, obtaining a total income of US $65. The yield in December 2001 was low and the annual income was US $749. Shellfish extraction is mainly the economic activity of single mothers or children. Other sources of income are limited for this

population stratum and consequently their living conditions are worse than those of the crew fishers.

(7) Shellfish intermediary's income and expenses

Shellfish intermediaries of El Triunfo buy ark shells (*Anadara spp.)* etc. from extractors who work on the intermediaries' boats. The gross income is approximately US $24,707. From this income, they disburse approximately US $21,871 for the purchase of shellfish, fuel, engine repair services, etc. and therefore their annual net income is US $2,836. The monthly income is approximately US $236 and household expenses are US $229. Therefore, it can be concluded that their finances are balanced.

Chapter 4 Artisanal Fisheries Production

4.1 Current Status and Characteristics of Coastal Artisanal Fishery

4.1.1 Coastal Fisheries Environment

River outlets and tidelands are concentrated along the Central American Atlantic Coast from Guatemala to Nicaragua. These highly productive aquatic areas are rich in minerals and nutrients and serve as nursery areas for the larva of many species of fish and crustaceans. Of the approximately 300 km of El Salvador's coastal line, cliffs are distributed between Punta Remedios and Puerto La Libertad. It is in this area where Los Cóbanos is located. Between Jiquilisco Bay and Punta Amahara lies El Jaguey. Both of these areas are characterized by varying water depths due to the presence of reefs. The rocky beach of Punta Remedios extends outward to a depth of 40 m. In the outlets of the Jiquilisco Bay or of the Lempa River, the bottom is constituted by mud that extends out to a depth of between 30 and 50 m. Along other coasts, the bottoms are predominantly constituted by sand and/or mud.[1]

A surface layer of high temperature, low salinity water, covers the coastal area of El Salvador. This is a result of the northern equatorial current of the Pacific Ocean. The temperature of the surface layer oscillates between 28 and 30ºC throughout the year, with a salinity of 3.4%. According to investigations carried out by the B/L Nansen, a layer of temperature discontinuity is formed between the depths of 30 and 75 m. Temperature variation with depth maintains a correlation with salinity and oxygen saturation. The layer of oxygen saturated is distributed among 10 to 20 m of depth, and below this area, the degree of saturation is less than 50%. On the other hand, the shallow coastal area (less than 50 m) is characterized by high temperatures, abundant oxygen, and rich fisheries resources. The marine currents flow from the coast of Costa Rica in the direction of the NW to W. As other Central American countries, with the exception of Nicaragua, the hydrographic conditions of El Salvador vary little throughout the year, and are unaffected by winds from the Atlantic Ocean.[2]

The continental shelf extends from the coast of Nicaragua to the border of Guatemala. The shelf decreases in width, as it gets closer to Guatemala. The distance from the coast to the fishing banks (depth of 50 m) is approximately 7.5 miles at Barra de Santiago, near Guatemala, and 5 miles at Los Cóbanos. This distance increases up to 10 miles at Puerto La Libertad.

The coast between El Maculiz and the Gulf of Fonseca is characterized by the complexity of

[1] FAO 1969 Result of exploratory fishing carried out in the Central American Pacific Coastal region by R/V Sagittarius, between December 1967 and December 1968. Technical Bulletin vol. III No. 4, Regional Project of Fishing Development in Central America.

[2] Investigation on fishing resources in the platform of pacific between Colombia and south of México.

its topography. Some areas require travel of up to 30 miles to reach the fishing grounds (50 m of depth). Table 4-1 depicts fishing banks according to depth.

The principal zone for the fishing of white and brown shrimp as well as for artisanal fisheries with gill nets is up to the depth of 50 m. The distance to the coast is 10 to 20 nautical miles. The fishing zone for Chilean prawn *(Pleurondoces planipes*) is between the depth of 100 m to 250 m and 40 nautical miles from the coast. At the depth of 200 m or more and 600 nautical miles or more from the coast, a shark longline are used. Within the EEZ of El Salvador, several Costa Rican tuna fishing long-liners as well as two Spanish fishing vessels operate. The following page shows the map of the fishing zone.

Table 4-1 Fishing Area (km^2) by Water Depth

Depth (m)	0-50m	50-100m	100-200m	200-300m	300-400m	400-500m	Total
Fishing Area	5090 km^2	8330 km^2	4330 km^2	1400 km^2	680 km^2	620 km^2	20,450 km^2

Source: Surveys of fish resources of the Pacific shelf from Colombia to Southern Mexico 1987, Bergen December 1988

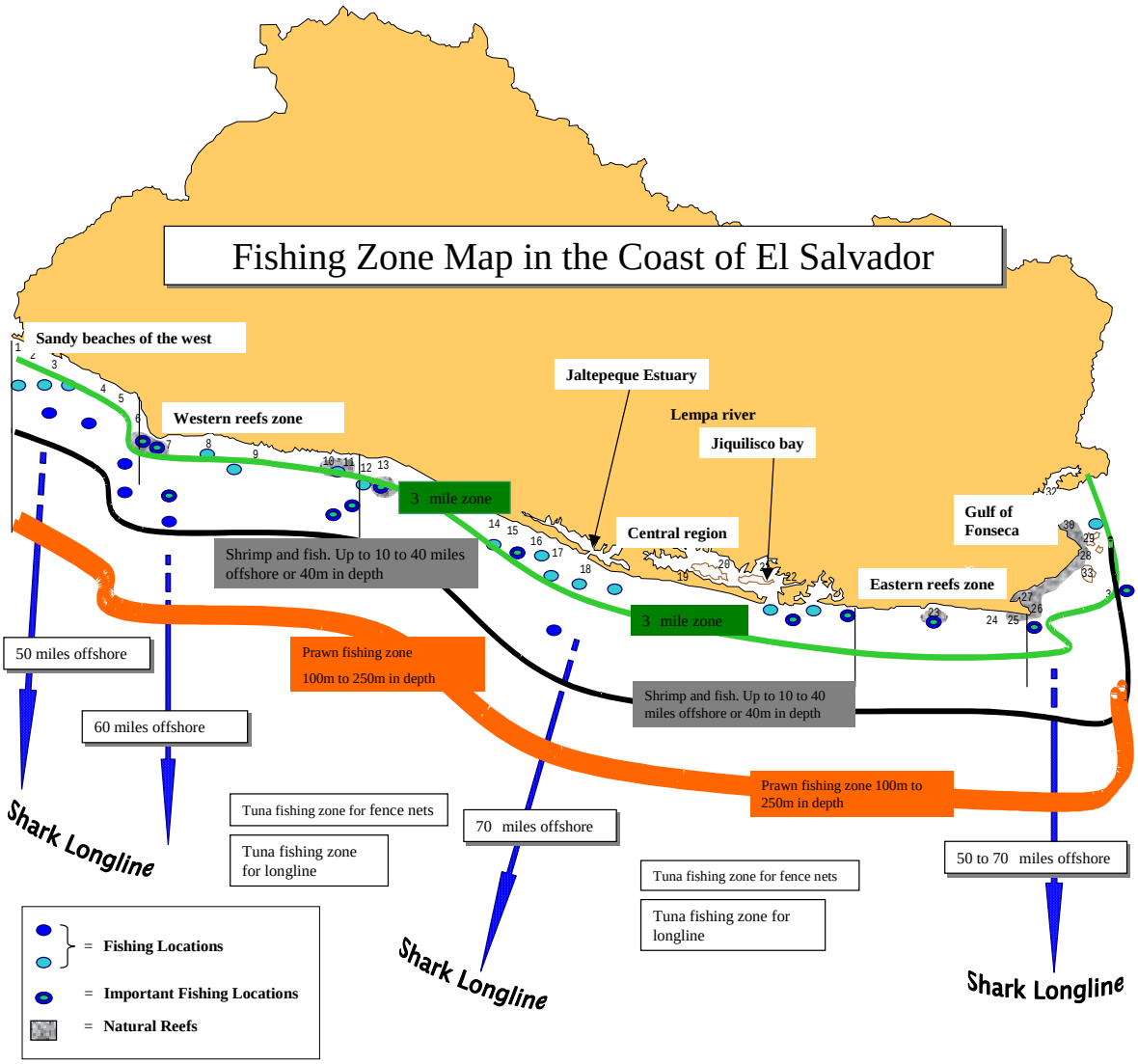


Figure 4-1 Map of the fishing zone in the coast of El Salvador

4.1.2 Artisanal Fishery at Sea

(1) Position of artisanal fishery within the fishery sector in general

The fishery sector in El Salvador can be divided in four sub-sectors: (1) industrial fishery, (2) marine artisanal fishery, (3) inland water fishery, and (4) aquaculture. According to statistics from CENDEPESCA (Table 4-2), the total capture increased from 8.362 MT/year in 1986 to a maximum of 14.999 MT/year in 1995, although it later decreased to 9.755 MT in 2000. Regarding fishing in inland waters, although production in 1986 was in the order of 1.816 MT, it reached 4.000 to 5.000 MT at the end of the 80's and beginning of the 90's. However, production in the following years decreased reaching 2.830 MT in 2000.[3] The total catch for

[3] However, as explained in chapter 6 and other chapters, statistics on artisanal fishery and inland water fishery present certain problems regarding its veracity, presenting difficulties in utilizing this data as a basis to design policies and strategies.

the year 2000 was ¢ 250 million (approximately US $28 millions) as shown in Table 4-2. The share of artisanal fishery at marine waters was 47% in volume and 33% in value. The capture of shrimp represents an important area for both industrial and artisanal fishery.

Table 4-2 Production for each sub-sector (1986-2000)

(Unit: MT)

Year	Marine water fishery							
	Industrial fishery		Artisanal fishery				Total at marine waters	%
	Quantity	%	Fishing Cooperatives	Private Fishery	Sub-total	%		
1986	3,614	43%	376	1,887	2,263	27%	5,877	70%
1987	2,351	33%	320	1,140	1,460	20%	3,811	53%
1988	2,642	34%	733	2,858	3,591	47%	6,233	81%
1989	2,840	29%	347	1,806	2,154	22%	4,993	51%
1990	2,696	29%	249	1,853	2,103	23%	4,799	52%
1991	2,013	18%	238	4,003	4,241	38%	6,254	56%
1992	2,821	22%	389	3,731	4,120	33%	6,941	55%
1993	3,947	31%	481	3,383	3,864	30%	7,810	61%
1994	4,214	29%	459	4,570	5,029	35%	9,243	64%
1995	4,857	32%	460	4,839	5,298	35%	10,155	68%
1996	6,360	45%	405	4,199	4,604	32%	10,964	77%
1997	4,229	35%	307	4,349	4,655	39%	8,884	74%
1998	4,119	39%	250	3,226	3,477	33%	7,595	73%
1999	2,771	28%	295	3,908	4,203	42%	6,973	70%
2000	2,099	22%	246	4,320	4,566	47%	6,665	68%

Year	Inland water fishery and aquaculture						Total
	Catch	%	Aquaculture				
			Inland fishery	Marine fishery	Sub-total	%	
1986	1,816	22%	61	609	670	8%	8,362
1987	1,665	23%	30	1,618	1,648	23%	7,124
1988	713	9%	15	704	718	9%	7,664
1989	4,025	41%	8	704	711	7%	9,730
1990	3,633	40%	8	704	711	8%	9,144
1991	4,345	39%	23	533	557	5%	11,156
1992	5,136	41%	46	493	539	4%	12,615
1993	4,461	35%	116	513	629	5%	12,900
1994	3,818	27%	170	1,155	1,325	9%	14,385
1995	4,325	29%	212	307	519	3%	14,999
1996	2,966	21%	116	242	358	3%	14,288
1997	2,809	23%	155	230	384	3%	12,078
1998	2,443	23%	298	100	398	4%	10,436
1999	2,653	27%	164	115	279	3%	9,905
2000	2,830	29%	64	196	260	3%	9,755

Source: CENDEPESCA's Statistic Department

Table 4-3 Trends in production in each sub-sector (1991-2000)

(Unit: ¢)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Industrial Fishery	102,577	134,612	184,782	216,299	267,508	216,066	186,354	247,618	192,585	135,088
Marine Artisanal Fishery	41,684	46,573	51,979	68,142	93,411	72,698	93,615	66,736	68,240	81,495
Inland water Artisanal Fishery	12,344	14,509	12,545	14,539	16,572	19,067	15,746	14,894	15,168	21,500
Aquaculture	8,267	11,310	16,128	49,606	10,028	8,279	9,631	6,336	7,492	11,732

Source: Fishery and Aquaculture Statistics 2000

(2) Profile of the Artisanal Fishery

In accordance with the study of PRADEPESCA (1996), there presently exists approximately 13,000 artisanal fishers and 6,100 boats along the coast of El Salvador. However, the number of fishers spread is increasing. The boats used in calm areas are traditional boats or cayucos (canoes), while the boats used offshore fishing are made from fiberglass (FRP Japanese style boat) and are between 20 feet and 25 feet (some large canoes are also covered with fiberglass). The fiberglass boats are usually equipped with outboard motors between 25 and 40 HP. Canoes are often equipped with outboard motors, most commonly 5 HP. According to the interviews at shipyards, the increase of the numbered of boats manufactured was at peak in 1996, and it can be estimated that the slight increase of about 100 boats was observed. In recent years, manufacturing has not increased substantially. Besides the registered artisanal fishers, there are between 3,000 to 5,000 women and children who make a living the harvesting of mollusks in the tidelands of Jiquilisco Bay and other estuaries. According to the artisanal fishing production statistics of CENDEPESCA, production was 4,566 MT (2000). However, there is an estimate that this could be more than 20000 MT.[4] Table 4-4 shows the catch amount and value of principal species in artisanal fishery. The table shows that shrimps and ark shells occupy an important position within artisanal fishery.

Table 4-4 Species of fish caught by artisanal fishery

(Unit: MT, Value ¢1,000)

Species	Snapper	Croakers	Spanish Mackerel	Catfish	Sharks	Other fish	Shrimp	Other Crustacean	Mollusks	Total
Catch	282	279	187	172	339	1,682	176	335	1,114	4,566
Value	5,433	3,304	1,747	993	4,117	11,664	22,257	9,236	22,744	81,495

Source: Prepared based on the Fishery and Aquaculture Statistics 2000

The history of artisanal fishing and its development was referred to in detail in Chapter 3.

[4] CENDEPESCA and FAO., Project of modernization of the fishing sector, Technical Report, TCP/ELS/4451, December 1994, San Salvador: According to the annual statistic report of the fishing sector, a production is estimated at 4,000 TM. Nevertheless, if 20,000 fishers capture 5kg a time, the annual production would be calculated as more than 20,000TM.

Originally, artisanal fishing was carried out by people in the coastal areas as a way of sustaining themselves. Fishing as an economic activity is not very old, only dating back to the 50's. Governmental support began in 1955. However, after 1968, the Governmental policy of promoting the development of the fisheries sector recovered its dynamism. This policy included the construction of fishing infrastructure as well as the development of organized fishing. In 1977, fishing ports and docks were built in El Tamarindo, Acajutla and Puerto El Triunfo, with financing from the Inter-American Development Bank (IDB). During the 90's, after the internal conflict concluded, the PRADEPESCA project began with the cooperation of the European Union (EU), through which studies were carried out on the current situation of artisanal fisheries and the fishers' organizations, etc. Additionally, in 1996, a Japanese cooperation project focusing on the promotion of the development of the artisanal fisheries through fishing cooperatives.[5]

Artisanal fishing ground can be classified into three areas; estuaries and river outlets, near shore area and offshore area. Fishing area in the estuaries, mollusks such as clams and oysters are caught, in addition to snapper by means of hand lines and gill nets. Other species caught are croakers, mullet, catfish and shrimp. Crabs are caught with the use of crab traps.

Fishing in near shore is carried out within 10-20 miles from the coastal line, at depths of up to 50m. These areas are characterized by their wealth in biological resources. The predominant activities are the capture of shrimp with gill nets (mainly drift bottom gill net). Mainly shrimp, croakers, snapper, sea bass, etc. are caught with these nets. Additionally, amberjacks, sharks, and Spanish mackerels, among other species are captured with surface drift gill nets. On the reefs, snapper and grouper are captured with hand lines and longlines. In addition, skipjacks, and dolphin fish are caught at the surface by trolling and hand line fishing.

According to the statistics, fishers go out to sea five days a week. Fishers affirmed that they go out to sea three to five days a week when capture is good. When capture is low, fishers may not fish for one to two weeks. In 1999, it was already heard that fishers could not cover even basic cost including fuel, with what was captured. This fact implies that current fishing activities are seriously limited.

The offshore longline fishery began in the mid nineties that artisanal fishers utilize mainly 25' fiberglass boats equipped with 40 and 70 HP outboard motors. This fishing is usually done around 70 miles offshore and the main species targeted are sharks and dolphin fish. Shark longline is also operated by a small number of boats with inboard engines (fiberglass, around

[5] Fishing boats FRP, fishing devices, ice machinery, refrigerators, etc were donated to the selected fishing cooperatives. This project consisted in that benefited cooperatives collected determined amounts from their associates in concept of fares of equipment use, which incomes were focused to the maintenance of infrastructures and equipments, as well as training for associates.

40 feet). This fact could be considered as an indicator of development of artisanal fishery into offshore fishing.

The by-catch collectors (moralleros) are fishing workers that lend services to shrimp trawl boats. They do such jobs as classifying the catch, processing (heading) shrimp, and in exchange, they receive morallas.[6] They are mostly artisanal fishers that come to shrimp boats with their smaller boats and offer their services for a set amount of time. There are generally several "moralleros" on each shrimp vessels.

4.1.3 Regional Characteristics of Artisanal Fishery

The coast of El Salvador can be divided into five fishing zones according to environment, topography of the marine bottom, and fishing techniques. Table 4-5 presents the number of fishers, boats, and fishing characteristics according to the zones.

- Sand Beaches of the West - Department of Ahuachapán and part of Sonsonate. It is the area from the border of Guatemala to just before Acajutla, characterized by sandy beaches and estuaries.
- Rocky reef zones of the West - East of the Department of Sonsonate and West of La Libertad. This is the area located between Puerto Acajutla and Puerto La Libertad, constituted by cliffs, small sand beaches, and reefs.
- Central Zone - East of La Libertad, La Paz, Usulután. The area encompasses San Diego Beach, Jalitepeque estuary, Bay of Jiquilisco, and the outlet of the Río Lempa. It is characterized by the presence of swamps and sand beaches that form a complex hydrographic system.
- Rocky reef Zones of the East - Department of San Miguel, and Southwest of La Union. This area stretches from west of El Cuco to El Tamarindo. It is constituted of cliffs and small sandy beaches.
- The Gulf of Fonseca - The entire Gulf of Fonseca including the islands.

Table 4-5 Number of Fishers, Fishing Boats and major Fishing Methods by Fishing Zone

	Sandy Western Beach Zone	Rocky Western Beach Zone	Central Zone	Rocky Eastern Zone	Gulf of Fonseca Zone

[6] Difference between receiving a portion of the catch and moralla: the portion of the catch is the type of high valued fish that are worth for shrimp vessels to take back such as snappers and sea bass. Morallas are a type of fish that has little or no value, which is not taken back to the base. Moralleros receive low-valued morallas as remuneration while the morallas with no value are returned to sea.

Number of Fishers	1621	741	8468	830	1379
Number of Fiberglass boats	331	323	1368	136	257
Number of Canoes	306	31	2577	163	670
Major Fishing Methods (In order of frequency)	Bottom drift gillnet, Hand line, Long line, Cast net, Trap	Hand line, Surface Drift gillnet, Long line	Bottom drift gillnet, Long line, Shellfish collection, Cast net, Trap	Surface drift gill net, Hand line, Long line	Bottom drift gillnet, Hand line, Cast net, Bottom gill net, Surface drift gillnet, Shellfish collection

Source: PRADEPESCA (1996) RRA Survey (2000) and CENDEPESCA artisanal fishery statistics data

(1) Sandy Beaches of the West

The main fishing communities of this area are Barra de Santiago, Bola de Monte, Zapote and Garita Palmera. The main fishing devices used are gillnets, hand lines and longlines. There are 1,621 fishers, with 331 fiberglass boats and 306 wooden canoes.

The main species captured are shrimp, butterfish (locally well-known as “hojas”), amberjacks, sea bass, Spanish mackerel, snapper, grunt and catfish.

In the estuary of El Zapote and in rivers, cast net or gill nets fishing is carried out on foot or with canoes. The main species caught are mullet and small shrimp (chacalines) that are caught in greater numbers during the rainy season, between June and August. The chacalines capture is approximately 2 kg maximum. The capture of mollusks and crabs also occurs in the estuaries, and it is feared that the populations of ark shells are at risk of extinction (RRA summary).

The fishing grounds are located 10 nautical miles from shore, with a depth of less than 50m. The mouth of the Paz River, which runs the length of the border with Guatemala, constitutes good fishing grounds. The fishers capture small sea trout, snapper, catfish, and shrimp with the use of bottom drift gill nets. The most productive time of the year varies according to species, but is generally from October to March (see the fishing analysis calendars in the RRA survey results). The capture fluctuates between 20 and 50 kg. Gill nets with extra float can also be used to capture Spanish mackerel, jacks or skipjacks. With the use of longlines, snapper, catfish, eels, and small sharks can be caught along the coast.

Table 4-6 shows the composition of the primary species captured per one fishing trip a month on the average. Shrimp capture represents a great importance for artisanal catch in this area. Although the catch was merely 4% of the total weight, it represented almost 50% of the total value unloaded per trip (1999). When comparing the average volume and the value per trip

between the years 1999 and 2000, it is observed that earnings have decreased as a result of a reduction in the capture of shrimp in spite of the capture volume of other species having increased.

Table 4-6 Catch Volumes for Each Embarkation, According to Month
(Artisanal Fisheries in the Department of Ahuachapán)

Year 1999

Species/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Average**
Catfish													
Shrimp	4.6	4.6	3.0	0.8	1.0	0.2	0.3	0.6	1.6	3.9	0.3	0.3	**1.8**
Croakers	9.1	4.2	6.8	8.8	6.7	8.0	9.0	4.2	6.1	3.4	4.7	1.8	**6.1**
Butterfish	13.4	2.8	19.3	28.9	26.7	10.6	19.3	16.4	21.2	18.6	7.0		**16.7**
Amberjacks				8.2		3.3	1.8	3.2	0.6	4.1		26.7	**6.8**
Spanish Mackerel	2.6	5.9	0.2	5.5	5.2	4.4	5.9	6.3	1.4	8.2	3.9	0.1	**4.1**
Other Fish	17.9	14.9	10.7	2.1	4.0	5.3	7.8	5.0	3.4	7.0	14.8	9.7	**8.6**
Snapper		0.9	0.6	0.4	0.1				0.8	1.1			**0.7**
Grunt									0.5		1.0	2.6	**1.4**
Total	**47.6**	**33.3**	**40.6**	**54.7**	**43.7**	**31.9**	**44.1**	**35.6**	**35.7**	**46.2**	**31.7**	**41.2**	**40.5**

Year 2000

Species/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	**Average**
Catfish	0.5	1.7							**1.1**
Shrimp	0.2	0.1	1.0	0.1	0.2	0.1	0.2	0.0	**0.2**
Croakers	3.0	0.5	3.2	8.7	5.7	26.1	24.3	5.4	**9.6**
Butterfish	13.3	6.4	7.2	20.0	13.4	9.0	10.0	16.5	**12.0**
Amberjacks	60.7	21.4	41.3	24.8	3.1		11.9		**27.2**
Spanish Mackerel	4.8	1.1	1.9	0.5	0.6	1.0	2.8		**1.8**
Other Fish	0.8	0.3	4.3	4.4	5.1	4.9	4.8	2.6	**3.4**
Snapper	0.2	0.3	0.2		0.0				**0.2**
Grunt	0.3	0.5	1.1		0.4				**0.6**
Total	**83.7**	**32.2**	**60.3**	**58.7**	**28.5**	**41.2**	**54.0**	**24.6**	**47.9**

1999	Landing (kg)	Revenue ($)
Average	40.6	35.25
SD	19.9	20.73

2000	Landing (kg)	Revenue ($)
Average	48.0	28.75
SD	29.1	12.65

Source: Survey Results of Ahuachapán fishers selected by CENDEPESCA

(2) Western Reef Zones

This area is rich in fisheries resources, and traditional fisheries have been developed around the reefs. Capture is carried out mainly with the use of hand lines and longlines. In total, 741 fishers, with 31 wooden canoes and 323 fishing boats (fiber glass), represent the artisanal fishing fleet. Puerto Acajutla and La Libertad are recognized as major artisanal fishing ports. There are small fishing communities such as Majahual, Mizata, etc, existing in this area. These small communities make their living by capturing oysters. The fishing community to the West of Puerto La Libertad has not developed much.

The main species captured are snapper, croakers, Spanish mackerel, catfish, shark, baracuda, grouper, parrotfish, grunt, skipjacks, dolphin fish, conger eel, oysters and shrimp.

The fishing grounds are located within 20 nautical miles from the fishing villages: A reef, 10 nautical miles off the coast of Los Cóbanos, which extends to a depth of 50 m is considered to be a good fishing ground. Another good fishing area exists 5 nautical miles off the coast of Puerto La Libertad, which is characterized by a sandy bottom with scattered rocks and is at a depth of approximately 30 m. In this area, gill nets and hand lines are utilized to capture fish. On the reefs located to the west of the Department of La Libertad, oysters are captured by means of diving. The highest capture of fish and oysters occurs in the months from October to March, and from November to April, respectively.

Acajutla is the only port in the country with direct access to the open sea, and a traditional fishery has been established for species of high commercial value such as snapper and grouper. However, due to the reduction of capture of these species in recent years, fishers are looking to the longline shark fishery (between 50 and 70 nautical miles offshore). This trend has also been observed in Puerto La Libertad and other fishing villages, and the number of shark long-liners has increased. The section on fishing gear and fishing methods will go into greater depth with regard to longline shark fishery.

A comparison of capture volumes (per trip) is made between the Acajutla (mainly longlines and hand lines) and the La Libertad (primarily, gillnets) cooperative. As represented in Table 4-7, Acajutla reported between 11 and 23 kg per trip in 2000, with an average of 17.5 kg. These amounts bring a market value of less than US $34 per trip even if the capture were dominated by species of high commercial value such as snapper and sea trout. Supposing that there are two fishers per boat, the net gain for each person is only around US $6 after paying expenses. It is probable that species of low commercial value are sold directly, and not through the cooperative, or that the amount declared is less than the true amount to avoid paying taxes.[7]

[7] However, in accordance with the study carried out in February of 2001, there was only a capture of 144kg with seven boats. Six of which only captured 10kg or less, this indicates that the amount declared or reported is not much less than the real gain. It should be noted that this data was taken from the cooperative's purchase books and it includes data for chacalines (small shrimp). Chacalines data has been omitted from capture numbers because they were bought form the moralleros.

Table 4-7 Monthly Capture Data (per trip): Cooperative of Acajutla (2000)

2000

Accumulated number of fishing trips	212	315	389	278	348	418	282	302	273	313	303	220		
Species/Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Average**	**SD**
Snapper	2.7	2.4	8.0	5.0	6.3	4.6	7.5	3.5	5.2	9.3	9.3	3.8	**5.63**	**2.44**
Spanish Mackerel	7.4	3.2	4.5	3.3	1.7	3.3	5.0	3.2	1.1	0.1	2.9	0.5	**3.02**	**2.03**
Croakers	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.6	0.1	**0.09**	**0.18**
Marine Catfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	**0.08**	**0.18**
Shark	1.1	0.4	0.3	0.8	1.2	0.5	2.3	0.8	2.1	0.9	2.9	4.1	**1.46**	**1.16**
Barracuda	0.0	0.1	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	**0.19**	**0.40**
Grouper	9.9	2.2	0.4	2.9	0.7	0.4	1.4	0.8	0.3	3.7	1.2	0.8	**2.07**	**2.69**
Parrot fish	0.5	0.8	0.2	2.1	0.9	0.8	2.6	5.2	8.9	3.6	1.0	1.9	**2.37**	**2.51**
Grunt	1.0	0.1	0.1	0.3	0.4	0.8	1.4	4.0	0.6	4.5	0.1	9.7	**1.91**	**2.87**
Other fish	0.0	0.1	0.0	0.5	0.1	0.5	1.1	0.6	0.3	1.4	2.1	2.0	**0.72**	**0.76**
Small shrimp	0.3	0.2	1.5	4.6	0.8	1.3	0.3	0.4	0.8	0.0	0.0	0.0	**0.85**	**1.29**
Total	22.9	9.6	16.4	19.9	12.2	12.1	21.6	18.6	19.5	23.7	20.7	23.5	**18.38**	**4.80**
Total w/o small shrimp	22.6	9.3	14.9	15.2	11.4	10.9	21.3	18.2	18.7	23.7	20.7	23.5	**17.53**	**5.10**

Source: ACOPAC 2000 (CENDEPESCA's Statistical Department)

Remarks: The members of this Cooperative only use hand line and long line fishing methods. Small shrimp is purchased to use as bait for snapper fishing

Table 4-8 presents capture volumes as recorded by the purchase registry at the Cooperative La Libertad Cooperative. This cooperative mainly carries out net fishing, including bottom drift gillnet for shrimp. The composition of fish species is diverse in comparison with the Cooperative of Acajutla. The average capture volume was approximately 15 kg in 1999 and 2000. Fresh fish are often sold on the pier, which can handle more than half the total volume captured, according to surveys. It is likely that the declared capture volume is less than the real volume, much more so than in Acajutla.

Table 4-8 Monthly Capture Volume (per trip): Cooperative La Libertad

1999

Accumulated number of fishing trips	156	215	117	240	221	178	253	356	132	213	255	209		
Species/Month	**Jan**	**Feb**	**Sea**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Average**	**SD**
Snapper	1.5	1.2	1.9	2.1	1.8	2.0	3.5	2.7	1.7	0.6	1.2	1.1	**1.76**	**0.78**
Croaker	0.9	0.7	1.4	2.4	2.5	2.3	1.4	2.2	2.4	1.3	0.8	1.1	**1.63**	**0.70**
Spanish Mackerel	0.0	0.6	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.2	0.7	0.1	**0.18**	**0.25**
Marine Catfish	4.0	6.4	8.8	0.6	0.3	0.1	0.2	0.0	0.0	0.1	0.8	0.1	**1.78**	**2.96**
Shark	0.0	0.1	0.0	1.1	0.6	8.3	5.1	2.1	0.0	5.9	5.7	0.1	**2.43**	**2.98**
Other fish	0.0	2.4	0.0	0.0	0.1	0.7	1.1	1.3	0.3	1.5	2.3	0.1	**0.82**	**0.90**
Grunt	8.4	6.6	3.0	4.2	2.8	2.6	2.3	3.4	1.7	3.6	3.1	6.8	**4.03**	**2.10**
Skipjack	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	**0.06**	**0.16**
Dolphine fish	0.0	0.4	0.0	0.1	0.5	0.6	1.6	1.7	0.8	0.9	0.7	0.4	**0.66**	**0.55**
Parrot fish	0.0	0.0	0.0	0.1	0.3	1.4	2.2	3.5	1.2	3.4	2.2	1.6	**1.32**	**1.29**
Groupers	0.0	0.1	0.0	0.0	0.3	1.1	0.8	0.0	0.0	0.0	0.0	0.1	**0.21**	**0.38**
Shrimp	0.0	0.2	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	**0.05**	**0.06**
Small shrimp	2.1	1.8	1.8	1.2	1.7	2.4	2.0	1.6	1.4	1.6	0.8	0.3	**1.56**	**0.58**
Lobster	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.01**	**0.02**
Other Crustacean	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.01**	**0.02**
Squid	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.1	**0.04**	**0.07**
Total	17.0	20.6	16.9	12.3	11.3	21.6	20.6	18.7	9.5	19.1	18.9	12.1	**16.55**	**4.15**
Total w/o small shrimp	14.8	18.8	15.1	11.1	9.7	19.2	18.6	17.2	8.1	17.5	18.1	11.8	**14.99**	**3.89**

2000

Accumulated number of fishing trips	197	224	245	197	213	199	244	170		182	202			
Species/Month	**Jan**	**Feb**	**Sea**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Average**	**SD**
Snapper	1.0	0.4	0.8	0.7	1.2	2.1	3.7	5.3	na	3.3	3.6	na	**2.21**	**1.65**
Croaker	1.0	0.9	1.6	0.8	1.4	1.3	2.1	0.8	na	0.8	0.8	na	**1.15**	**0.44**
Spanish Mackerel	0.9	0.1	0.4	0.0	0.0	0.0	0.2	0.0	na	0.0	0.0	na	**0.16**	**0.28**
Marine Catfish	0.2	7.3	11.7	10.8	0.3	0.2	0.0	0.1	na	0.0	0.0	na	**3.06**	**4.86**
Shark	0.3	1.0	0.9	1.4	0.0	0.1	0.4	0.1	na	0.3	2.8	na	**0.73**	**0.87**
Other fish	0.3	1.5	3.6	4.7	0.4	0.3	0.0	0.3	na	0.3	0.5	na	**1.19**	**1.64**
Grunt	4.4	5.0	2.4	8.7	1.9	0.7	1.0	1.7	na	3.2	3.8	na	**3.28**	**2.38**
Skipjack	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	na	0.3	0.0	na	**0.11**	**0.25**
Dolphine fish	0.5	3.1	1.8	1.7	0.3	1.0	0.7	1.0	na	0.5	0.6	na	**1.11**	**0.86**
Parrot fish	1.5	2.8	2.3	1.2	1.2	0.6	1.7	3.1	na	2.1	1.0	na	**1.75**	**0.80**
Amberjack	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	na	0.0	4.5	na	**0.46**	**1.41**
Grouper	0.2	0.2	0.0	0.0	0.0	0.9	0.1	1.0	na	0.1	0.4	na	**0.28**	**0.36**
Shrimp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	na	0.0	0.1	na	**0.02**	**0.03**
Small shrimp	0.4	0.4	1.0	0.5	1.2	0.8	1.5	1.5	na	1.7	2.1	na	**1.11**	**0.61**
Lobster	0.1	0.0	0.0	0.4	0.3	0.0	0.0	0.0	na	0.0	0.0	na	**0.08**	**0.13**
Squid	0.1	0.0	0.1	0.2	0.0	0.0	0.2	0.2	na	0.0	0.1	na	**0.10**	**0.08**
Total	10.9	23.4	26.7	31.1	8.2	8.1	11.7	15.1	na	12.6	20.3	na	**16.80**	**8.10**
Total w/o small shrimp	10.5	23.0	25.7	30.6	7.0	7.3	10.2	13.5		10.9	18.2		**15.70**	**8.26**

Source: CENDEPESCA's capture statistics for the Cooperative La Libertad

(3) Central Region

This is an extremely complex hydrographic area, which encompasses the Bay of Jiquilisco, the Jaltepeque estuary, and the mouth of the Lempa River. Numerous small fishing communities are distributed throughout this area. The major communities are Herradura, San Antonio Los Blancos, Puerto El Triunfo, Puerto Parada, and Méndez Island.

In the calm waters of the estuary, fishing is mainly done in canoes. There are 2,577 wooden canoes, and 1,368 fiberglass boats operating in this area. This area has the highest number of fishers in the country, with 8,468 fishers representing 65% of the national total. In addition to this, three to five thousand women and children work in the extraction of mollusks. Before the recent decrease in capture in the estuary, efforts began to carry out open sea fishing using fiberglass boats powered by outboard motors.

The main species captured are ark shells (and curilillas), shrimp, mullet, croakers, catfish, snapper, crabs, sea bass, grunt, sharks, conger eels, clams, sardines and anchovies.

Coastal fishing is mainly carried out in shallow waters up to 2 nautical miles from the coast. Some boat travels to the coast of La Libertad, 20 miles up the coast. Some fishers in Jiquilisco Bay and Méndez Island capture shrimp with bottom drift gill nets. During the high season (October to February) these fishers camp near the mouth of the bay.

Capture volumes vary between 4-10 kg per trip during the high season (April to October) whereby most fishing is done with gillnets. The most favorable months for catching shrimp are October and November during which volumes oscillates between 0.2 kg and 12 kg per trip. The high season for longlining is between October and March. In recent years, the capture of ark shells was only 12 to 24 pieces per fisherman, with less being captured near fishing communities (according to RRA results).

In accordance with statistics from CENDEPESCA, small shrimps and squid capture lead in terms of volume. Squid for the most part are morallas of shrimp trawlers. This indicates a large number of “moralleros” are in this area. It is very probable that the capture of conger eels also comes from the by-catch of shrimp trawlers.

(4) Eastern Region: Reef Zone

This area has reefs that constitute good fishing grounds. The main fishing communities are El Cuco, El Jaguey, El Maculiz, Playa Torola and El Tamarindo. The fishing is carried out entirely along the coasts. Playa Torola serves as a center for collection and processing of morallas with high cargo volume and activity. Groups of fishers also carry out the processing and the sale of fresh fish in other communities. The fishing fleet includes 163 wooden canoes and 136 fiberglass boats, with the number of fishers totaling 830 people. The main species of fish are

croakers, sharks, grunt, snapper, Spanish mackerel, catfish, conger eels, sea bass and shrimp.

The main fishing grounds are located within 10 nautical miles of the shore, along the coast of El Cuco, in the mouth of the Espino estuary, and Punta Amapala. However, boats sometimes go to the Sea of Nicaragua (Gulf of Fonseca) to carry out fishing operations. The main fishing method is bottom drift gillnet for shrimp. Lobsters are also captured with gillnets. Fishers also capture sea bass, Spanish mackerel and shark with gillnets with mesh sizes from 10 to 15 cm. Additionally, shark, snapper, and catfish are captured with longlines.

The high season for shrimp gill net is from November to February when captures are usually 20 kg maximum and 1kg minimum. The total capture of snook with gillnets may reaches to 200 kg (including other fish caught by the net). The high season is between November and May. For Spanish mackerel, the maximum capture with drift nets is around 300 kg, with a minimum of 20 kg. The fishing season is between November and December. The high season for snapper longlining is from January to March, with captures that can total up to 120 kg. Longlining for conger eels can yield a capture of up to 360 kg. In El Tamarindo, several boats carry out offshore shark longlines (according to the RRA survey).

(5) Gulf of Fonseca

The Gulf of Fonseca offers good fishing grounds for shrimp and demarsal fish, so much so that traditionally it has been a focus for fishing activity. In addition to La Union where the main fish collection center is, the fishing is dynamic in the islands of Zacatillo, Conchaguita and Meanguera, with a predominately lobsters and groupers catch in the rocky areas. Around the island, abundant reserves of lobster and grouper in the rocky areas are found. The fishing fleet includes 670 wooden canoes, and 257 fiberglass boats, operated by 1,400 fishers in total.

In comparison to other zones, there are varieties of fishing methods used in artisanal fishery. These include shrimp gill nets, surface drift nets for Spanish mackerel, bottom gill nets for lobster, cast nets, longlines, and hand lines. Within a few nautical miles of the coast, snapper, sea bass, croakers, catfish, shark and grunt are captured. Also some fishers carry out offshore shark longlines.

The east coast of Conchaguita Island, inside the Gulf of Fonseca constitutes a good fishing ground for shrimp, and numerous artisanal fishing boats with gill nets fish in this area. Capture can reach the order of 60kg during a favorable period, if small demarsal fish is included. The high season is June, and between November and March. Some fishers claim that the high season for mackerel is between November and January, while others say it is between February and May. The capture can be as much as 200 kg. The high season for longlining has not been specified. It has been reported that the capture of conger eels by means of longlines can sometimes be as high as 300 kg.

In the mangrove swamps that grow along the edges of the Gulf of Fonseca, shrimp and other marine products are captured with gill net, cast net, and crab traps. The capture of snapper, sea bass, mullet, etc, is also carried out using a method called “Manga” a type of set net.

Since the Gulf of Fonseca is adjacent to Nicaragua and Honduras, not only do fishery communities have an intensive commercial exchange of fisheries products crossing the border, but also boats can operate in the waters of the neighboring countries. For example, Salvadoran fishers go to the neighboring countries to capture oysters, and ark shells. This is due to the reduction of national stocks, which has made it difficult to satisfy the local market demand.

4.1.4 Fishing Gear and Methods

Many of the fishers are familiarized with the making of fishing gear. During days of rest, the fishers usually repair their nets, change fishhooks, or branch lines on longlines. The fishers have also been observed weaving cast net out of fine mesh size (15mm). In spite of the short history of coastal artisanal fishing, one can affirm that the fishers have mastered construction and repair of the small types of fishing gear.[8] However, the fishers invent very little, and they do not practice other fishing methods besides gillnetting or longlining. The following describes the main fishing gear and methods currently utilized.

(1) Bottom gill net

The predominant equipment used for capturing shrimp is the bottom gill net (drift). The nets are not fixed to the bottom but are allowed to drift with the bottom currents. The fishers carry out active operations predominantly during the day, because it is dangerous to work at night in the operation area of trawl boats or during the period when the sea is rough. However, they are unable to capture shrimp of nocturnal species, the drifted nets are used along the bottom instead of a fix bottom gill net. The operation is carried out, in general, leaving the beach at 6:00 in the morning, and the nets are hauled in after drifting for one to two hours. The operation is carried out two or three times a day in shallow areas (less than 50 m). Most of the nets used for shrimp are made from monofilament (nylon) with 2.5 inches (6 cm) mesh, a length of 300 m, and height from 3 to 6 m. Hanging ratio varies from 40 and 50% and it is considered reasonable. The floats are placed at 2 or 4m intervals, while the leads are spaced at 30 or 40 cm. Due to the small mesh, these nets not only catch shrimp, but also juvenile fish. Some fishers are using double nets to capture shrimp. This net is referred to as “the devil's net”. This type of net is illegal, but regulating its use has been difficult.[9]

[8] As special fishing techniques, it has been seen that in reef areas, some fishers were able to determine whether the bottom was rocky or muddy submerging the paddle in the water and listening to the sound transmitted through it

[9] Regarding the double nets, in many cases, nets with mesh of 2.5 inch and 3 inch are used together. CENDEPESCA tried to enforce the regulation in the past though it was abandoned due to a strong resistance from the fishers. They argued that it was not fair to ban the use of the small mesh size while shrimp trawlers are allowed to use the small mesh.

Shrimp nets or relatively large mesh size nets are used as fixed bottom gill net to catch fish. The main species captured are snapper, croaker, sea bass, grunt and sharks.

(2) Surface Drift Gillnets

The floating drift gillnet is used mainly to catch Spanish mackerel. The meshes are predominantly from 10 to 17cm for capturing large mackerel (of more than 60 cm). Skipjacks, jacks, and barracuda are also captured. Spanish mackerel fishing is carried out mainly at night, and the net is tied to a boat. In general, boats come out around 5:00 PM, and the net is drifted with the boat at the fishing grounds. Fishing is conducted twice, the boat returns to the beach at dawn. Capture volumes vary considerably day to day, reaching a maximum of 300 kg, according to some fishers. Some fishers from the eastern reef areas use nylon twine nets with 20 cm mesh to catch sharks. Others use shrimp gill nets with 6cm meshes, with added floats (with plastic bottles) in mid water. In this case, fishers can only catch small barracuda or mackerel.

(3) Longlines

The longlines used in the artisanal fishery are mainly the bottom longlines. These are outfitted with #6 fishhooks. Pieces of cheap fish are used (skipjacks, etc.) as bait. To fish snapper, small shrimps are often used for bait. The fishers set the line in the fishing grounds in the morning and they recover them in the afternoon before returning to port. Usually, the main lines are made of 3mm nylon rope, and the branch lines are nylon monofilament or twine. The branch lines have an approximate length of 1 m. The main line usually has approximately 500 branch lines with intervals from 3 to 6 m. The fishing gear is kept in a plastic container the size of 60cm x 30cm x 40cm.

(4) Offshore Shark Longlines

Usually, 25’ FRP boats equipped with two 40 to 70 HP outboard motors are used. Although normally one of the two motors should be used as a reserve unit in case the other is damaged, many fishers use both motors simultaneously. The captain of a shark fishing vessel is a fisherman experienced in offshore navigation. He is usually endowed with knowledge and a technical basis for reading nautical maps and charting the vessel location with the use of GPS.

At present, 40 artisanal fishing boats based in Acajutla, carry out the capture of sharks in offshore waters. Several units also exist in the small fishing communities of La Libertad, Barra de Santiago, El Tamarindo, and the islands of La Union. Usually, boats go out to sea at dusk and return to port after two days of fishing. Some fishers capture skipjacks for bait the first day, and leave for offshore the same night or day until the dawn of the following day. Two operations are carried out for each trip. The longlines not only capture sharks but also dolphin fish and the volume can be more than 400 kg in the high season. Besides the boats with outboard motors, three 40’ boats with inboard engines exist in Acajutla, and one La Union that

is also used for longlining sharks. These artisanal boats, together with the 43' shark longline boat donated by Japan presently operating in La Libertad are the pioneers of artisanal fishery to expand toward offshore fishing.

(5) Seines

Small seine nets are used in the sandbank of Jiquilisco Bay. The nets are of very fine meshes (mosquito net) of approximately 1mm in which sardines and small anchovies, less than 10cm, are caught in the bay. The fishers, upon finding the fish come closer with canoes. They encircle the school with nets of 250 m in length and 2 m high. Later on, two fishers enter the water and they begin gathering the net. Finally, the net is dragged toward the bank and hauled out on the shore. The fish are dried in the sun before being sold.

(6) Cast net

The cast net is one of the most widely used types of fishing gear in El Salvador. Usually, the fishing is carried out in the fishing grounds of calm water such as estuaries or rivers, using canoes without outboard motors. The nets are constructed of 15mm mesh and are good for catching small fish (sardines, etc.) or small shrimps. The study team observed cast netting for lobsters carried out in the islands of La Union.

(7) Crab traps

These crab traps are used to catch small crabs in estuaries. They are a simple apparatus that consist of bars shaped into circles (30 cm diameter) and covered. The bars are 5mm in diameter. Pieces of discarded fish are used as bait. Usually, ten crab traps within a certain interval are thrown throughout the length of the mangroves, and lifted after leaving them submerged for 10 minutes or so.

(8) Hand lines

Hand lines are used in rocky areas to catch high commercial value demarsal fish such as snapper, and grouper. They are also used in the offshore to catch skipjacks, jacks and yellow fins. For these species, the hand lines are used in the surface or mid water at the fishing grounds located around 10 nautical miles from the coast. Many fishers utilize hand lines while waiting to harvest gillnets or longlines. The depth of the fishing ground is approximately 50m and small shrimps are used as bait to catch fish of high commercial value. The communities where hand lines are most commonly used are Acajutla, Los Cóbanos, La Libertad, and El Cuco.

(9) Trolling

There are few communities that use trolling as a primary fishing method. In general, this fishing is carried out in the early morning hours, as the tide falls at the fishing grounds. Captures include pelagic fish such as Spanish mackerel, skipjack, and dolphin fish.

4.1.5 Production Costs

Fuel represents a high percentage of the total cost of production for artisanal fishing. The recent rise in the price of gasoline and a reduction in capture are affecting the profitability of this sector, so much so that the fishers are forced to postpone operations. Many of the fishers try to increase their boat's speed unnecessarily by equipping them with large motors, regardless of the type of fishing method or fishing condition. In the case prices of fuel rise in the future, (fuel containing oil: US $2.30/gallon in the urban area in 2001) fishing becomes unprofitable when there is not enough catch.

As indicated previously, in the case of offshore longlining for sharks, some 25' fiberglass boats are equipped with two 70 HP outboard motors. High power engines are necessary when considering that the boats travel up to 70 nautical miles offshore and that they bring back the catch before the quality of the catch declines. Having two large motors can help to offset setbacks such as mechanical problems or the threat of unexpected weather changes. Nevertheless, even with these considerations it is still thought unnecessary to equip these boats with such large motors. At present each one night - two-day trip, yields 1000 lb (450 kg), and this is presently adequate to cover high fuel cost (approximately US $180 for each trip, supposing consumption of 80 gallons). However, with the decreasing returns on the catch, it would be prudent to consider implementing measures to reduce operational costs.

The boats face the continual risk of being overturned when crossing the breakwater area when leaving and returning from fishing, as such, this can serve as a limitation to the number of working days. However, experienced Salvadoran fishers have mastered the techniques of crossing the waves. The study team has witnessed how they appropriately cross the waves, and their seamanship skills while handling their boats. Although their propellers sometimes contacted the bottom because the motor was not appropriately lifted, the damage seemed insignificant due to the boats slow speed and the absence of rocks. The RRA survey also showed that this doesn't constitute big problems for the fishers. However, sand sucked through the cooling water intake can accelerate the deterioration of the rubber impeller in the water pump. This can seriously reduce the internal water flow within the engine thus causing increased temperatures and mechanical damage to the motor. Building jetties can solve the problem of passing through the breakwater area, although this alternative is not very feasible in relation to its high cost as well as potential risk of farther overexploitation of demarsal species.

The study of operation costs also analyzed motor horsepower in relation to boat size and type, as well as propeller size (diameter and pitch). The tests carried out during the study were on 25 and 40HP motors (Table 4-9). The study considered the mounting angle of the motors, as well as the relationship between fuel costs and distance traveled at full power and at 80% power. In the case of 25 HP motors, changing the assembly angle and bringing the motor closer to the

hull, increased speeds by 0.5 nautical miles/hour (3% decrease in fuel consumption). For 40 HP motors, the position of the motor assembly was appropriate. In reference to fuel consumption, when maintaining the power at 80%, 50cc of fuel could be saved for each nautical mile traveled (a 5% improvement). This suggests that significant savings can be realized when traveling to distant fishing areas. However, it was not possible to demonstrate the fuel savings for the 25 HP outboard motors by decreasing power to 80%.

Table 4-9 Performance Testing

Matching Test of the boat and out board engine
Date: October 19, 2000 Place: La Libertad 25HP engine
Weather: Clear, No wind, Wave height 0.5m 3 people on board No fishing gear

Outboard engine data **Boat data**

Year of Purchase	1996, Grant aid from Japan	Length	20ft
Serial number	E25A61RL451761	Width	1.5m
Propeller size and pitch	9 “1 0 13F	Depth	0.65m

	Direction	Engine RPM	Speed (mile/h)	Average speed	Fuel Consumption	Distance / Period	Pin Position
Neutral		7500					
Full throttle	SE	4650	16.8				3rd hole
	NW	4600	16	16.4			3rd hole
Pin Position Adjustment	SE	4700	17.4				2nd hole
	NW	4600	16.4	16.9			2nd hole
	SE	4700	17.7		2200	1.5mile/5 min	2nd hole
	NW	4700	16.3	17	(759/mile)	1.4mile/5 min	
80% throttle	SE	4000	14.1		1820	1.2mile/5 min	2nd hole
	NW	4000	12.9	13.5	(791/mile)	1.1mile/5 min	2nd hole

Matching Test of the boat and out board engine
Date: October 19, 2000 Place: La Libertad 40HP engine

Out board engine dates **Boat dates**

Year of Purchase	1996, Grant aid from Japan	Length	24ft
Serial number	E40G6F6L379692	Width	1.7m
Propeller size and pitch	11 1/2 x12	Depth	0.67m

	Direction	Engine RPM	Speed (mile/h)	Average speed	Fuel Consumption	Distance / period	Pin Position
Neutral		7500					
Full throttle	SE	4700	23.1				3rd hole
	NW	4700	22.6	22.85			3rd hole
Pin Position Adjustment	SE	4600	23.2				2nd hole
	NW	4600	22.2	22.3			2nd hole
	SE	4500	22.4				1st hole
	NW	4600	22	22.2			1st hole
	SE	4650	23.1		3700	1.9mile/5 min	3rd hole
	NW	4700	21.6	22.35	(1000/mile)	1.8mile/5 min	3rd hole
80% throttle	YOU	4000	18.3		2750	1.5mile/5 min	3rd hole
	NW	4000	16.5	17.4	(948/mile)	1.4mile/5 min	3rd hole

4.1.6 Outboard engine repair

(1) Outboard engine use and repair

There are seven outboard engine brands circulating in El Salvador: Yamaha, Mariner, Johnson, Evinrude, Mercury, Suzuki and Tohatsu. Each brand has its local dealer, but the same house may represent several brands. The nearly 3,300 boats currently used in artisanal fishery are equipped with 5 to 75 HP outboard engines. The main brands used are Yamaha and Mariner.

The most common repair service includes the repair of flooded engines, cylinder carbon cleaning, carburetor cleaning, spark plug cleaning and change. It has been frequently observed that in spite of the fact that the mechanics have the appropriate technology, fishers cannot repair their equipment because they lack the money to buy the necessary parts. In general, fishers take good care of their outboard engines because they are expensive. In El Salvador, only genuine products are used.

The average life of outboard engines has been estimated to be six years. This criterion also applies in El Salvador even though it was observed that some equipment is seven to 15 years old depending on the time it has been in operation as well as on the preventive and corrective maintenance that the unit has received. Based on the maintenance conditions observed as of November 2000 (approximately 6,000 hours of service), the outboard engines supplied in 1996 within the framework of the Fisheries Grant Aid of Japan,[10] 65 out of the 75 units supplied are in operation. Five out of the ten units that are out of service can be repaired and only one cannot be repaired at all. The four remaining units were stolen. The main cause for irreparable damage is the submersion of the equipment when a boat capsized.

(2) Outboard engine repair system

One of the dealers has two technicians who have been trained in more than five technical training courses given by the manufacturer in the Central American region. The premises are strategically located and have 15 repair technicians with five years of experience capable of preventive maintenance and most of the repairs. Another dealer has one technician with more than six years of experience who has been trained in several seminars.

The manufacturer sends repair technicians at an interval of six months to two years. Such technicians make a tour of the fishing communities of the country in order to take care of the difficult repairs and train top technicians. With the support of Japan, CENDEPESCA and FACOPADES receive the visit of a Mexican technician specialized on the repair of outboard engines.

[10] Takafuji's Note (November 2000): Results of the study on the operation of outboard engines supplied by the Non Reimbursable Cooperation of'96.

At the result of these training efforts, the fishing cooperatives and communities now have several persons who are capable of making minor repairs. Furthermore, a preventive maintenance system has been implemented. The users also give routine maintenance such as washing engines in tanks with clean water, rinsing the cooling equipment with clean water, etc. However, there are problems such as engine deterioration due to the use of cheap fuel (mixed fuel) or bad repairs that later result in serious mechanical damage. In summary, in El Salvador the technical level of the repair of outboard engines is generally acceptable even though there are problems such as the lack of resources to buy the necessary parts or lack of fishers' awareness.

4.1.7 Industrial and Artisanal Shrimp Fisheries

Shrimp fishery constitutes the nucleus of the Salvadoran fishing industry. However, after 1997, capture volumes experienced a constant decline, seriously affecting both large commercial companies as well as artisanal fishers. The shrimp fishery began during the 50's, and it experienced an extremely quick development. However, reports of overexploitation began to surface in 1968,[11] and successive reports followed. Consequently, the government tried to place restrictions on the number of boats and to establish closed seasons, but these regulations were never enacted (refer to box 4-1 "History of Shrimp Fishery"). It was finally in 2002 that a total ban for shrimp fishing was implemented for a month.

Shrimp populations have a life cycle of one or two years, thus they recover quickly from fishing pressure. Nevertheless, stocks are presently being overexploited with more than 90 shrimp trawlers operating along a coast of only 300 km. These ships also cause substantial damage to coastal demarsal fish stocks. A study carried out by FAO (1969) pointed out that the reduction of shrimp capture along the Salvadoran coast are due to concentrations of commercial shrimp trawlers operating in this area. Many of the artisanal fishers interviewed believe that the main causes for decreased catches are related to the by-catch of juvenile fish by commercial vessels.

Artisanal fishers used to enjoy a relatively high income thanks to the high commercial value of shrimp. At present, the main equipment used to capture shrimp is a bottom gill net with 2.5 inches meshes (approx. 6 cm). These same nets are also used to capture fish, and as a result, they only catch small fish. Recently, artisanal fishers have started to use "double nets", and consequently increased pressure on fish stocks.

Since then, some fishers have not been able to fish since they are unable to cover the costs of

[11] FAO. 1969. Result of exploratory fishing carried out in the Pacific Ocean Region of Central American by the S/V Sagitario. December 1967 to December 1968, Technical Bulletin Vol.III No4, Project. Regional Fishery Development Project of Central America.

fuel. This tendency can also be seen in the statistical data of the fishery sector (Table 4-10, Figure 4-2). It is deduced that this situation is due to intense fishing of demarsal fish and shrimp along the coast.

The area extending to 10 nautical miles from the coastline contains rich fishing resources. Both industrial and artisanal shrimp fishers share these fishing grounds. Although the former Fishery Law which functioned until 2001[12], had prohibited the operation of shrimp trawlers within 3 nautical miles, this area is where large populations of white fish exist, thus shrimp trawlers carry out daily illegal fishing by using the trawler's nets. These trawlers destroyed the fish habitat as well as over-exploited shrimp and juvenile fish. They also caused other damage, for example, through the destruction of the artifices of the artisanal fishers, and collisions with their boats. This situation has arrived at a level that cannot be controlled or ignored.[13]

Since shrimp trawling constitutes an important factor when planning the development of artisanal fishery, this report reviews the problem of these boats in "Chapter 5: Fisheries Management", although it is not a topic usually covered in artisanal fisheries.

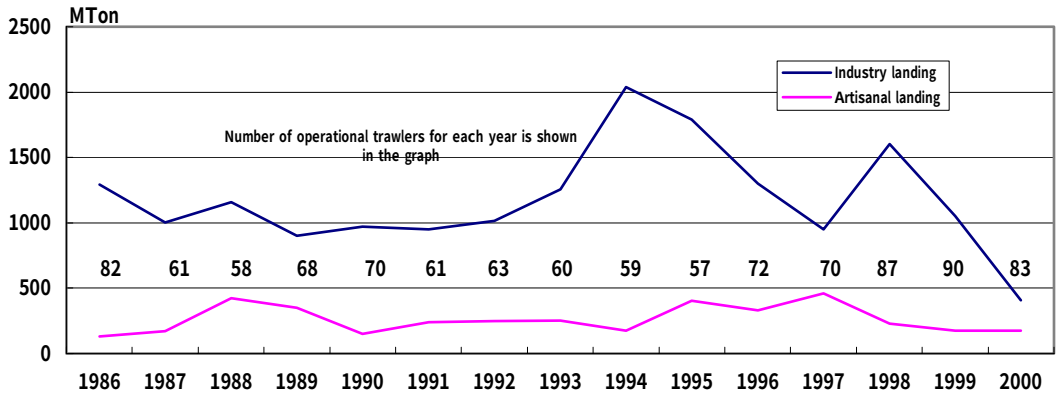
[12] The New Fishery Law that abolish the areas of veda for trawling within the 3 nautical miles from the coast, was promulgated in December 2001, when the present study was at its final phase.

[13] Between the months of January and March 2002 five cases of damages were reported in El Triunfo and two cases in la Unión. From this, 6 cases consisted on the deterioration of the encircling gill net by the trawl boat and one by an artisanal boat. Considering the fact that not all damages are reported to the offices of CENDEPESCA, it can be estimated that the latent damages of these and other zone offices are numerous.

Table 4-10 History of Capture Volumes for Shrimp and Accompanying Species
(Between 1982 and 2000)

	Changes in number of shrimp trawlers			Shrimp landing	Small shrimp landing	The portion of the catch landing	The portion of the catch crustacean landing	Industry total landing	Artisanal Shrimp landing
Year	#of company	#of Registered trawler	#of Operating trawlers	(MTon)	(Mton)	(Mton)	(Mton)	(Mton)	(Mton)
1982	12	68	54	na	Na	na	na	na	na
1983	12	na	52	na	Na	na	na	na	na
1984	16	91	71	na	Na	na	na	na	na
1985	24	126	59	na	Na	na	na	na	na
1986	31	137	82	1293	1631.6	588.3	13.7	3526.6	132.4
1987	28	134	61	1002.9	996.4	334.8	17.1	2351.2	171.4
1988	20	82	58	1158.3	1286.6	189.2	7.5	2641.6	425.5
1989	26	96	68	900.7	1755	174.5	9.6	2839.8	351.2
1990	26	92	70	972.1	1382.7	314.5	27.1	2696.4	152.6
1991	25	90	61	951.7	772.2	278.5	10.3	2012.7	240.4
1992	25	82	63	1015.1	1489.4	306.2	10.2	2820.9	248.6
1993	24	73	60	1257.4	2362.6	288.8	37.8	3946.6	254.3
1994	21	79	59	2038.6	1736	407.7	31.5	4213.8	175.8
1995	23	80	57	1788.9	2671.5	364.6	31.9	4856.9	402.3
1996	24	89	72	1302.8	4785.7	255.1	16.5	6360.1	328.6
1997	22	84	70	951.1	2924.9	299.1	53.7	4228.8	458.9
1998	24	90	87	1601.8	2864.5	187.5	21.1	4674.9	230.0
1999	24	90	90	1053.7	1572.8	285.9	7.8	2920.2	174.0
2000	24	90	83	409.3	1383.4	241.4	19	2053.1	175.0
			Average	1179.8	1974.4	301.1	21.0	3476.2	261.4
			SD	397.7	1015.2	102.6	13.2	1221.1	106.6

Source: CENDEPESCA Annual Statistics Report



Source: Prepared based on the results of Table 4-10

Figure 4-2 Annual Variation of the Capture Volumes for Commercial and Artisanal Shrimping

Box 4-1

History of the Development of the Commercial Shrimp Fishery

- American engineers introduced commercial shrimp trawling to El Salvador between 1952 and 53. In 1955, the total number of shrimp trawler was determined to be 43, as was recommended by earlier studies. The Ministry of Economy promoted the development of the shrimp companies. Consequently, their goal was achieved as 43 trawlers are obtained during the years of 1956 and 58. At the same time, a study done by FAO found the number of fishing vessels to be adequate. However, in 1959, the government was forced to increase the fleet to 60 vessels because of pressure from shrimp companies.
- In 1961, decreases in captures were noticed due to increased fishing pressure. The results of a study exposed the potential for the development of shrimp resources in deep water further offshore. As a result, in 1962, the fleet grew up to 73 ships.
- The experts of FAO, during a study carried out in 1965, recommended limiting the fleet to 47 vessels. This recommendation could not be complied with, and the fleet remained at 73 vessels. In 1979, the 73 vessels captured 428.2 MT (price CIF: ¢ 5,316,031), with 13 companies, in total.
- In 1982, the fleet grew to 85 vessels, and in 1989, they issued 226 fishing concessions in total.
- In 1983, CENDEPESCA tried to prohibit fishing during the months of June to August of the following year, but this was not done due to strong resistance from those affected. At the same time, artisanal fishers began to capture shrimp with trawls.
- In 1987, the shrimp industry regulated their operations voluntarily due to the reduction in capture volumes.
- In the same year, the B/L Nansen carried out a study exploring the development of new resources.
- In 1990, the number of concessions decreased to 158, and the fleet increased to 105 vessels.
- In 1999, the number of concessions was determined to be 90 and that was the number of vessels that operated that year.
- In 2002, a total ban for shrimp fishery was implemented for one month.

4.1.8 Development of Underutilized Marine Resources

To date, multiple studies on marine resources have been carried out in the waters of El Salvador. The main studies are as follows: "The Study of Fishing Resources by Means of Trawling," by the B/I Nansen (1988)[14]; "the Experimental Operation of Longlines by the Ships Falcon and Captain Mack" (1992)[15]; "Experimental Captures of Deep Sea Resources by Means of Trawling" by the B/I Fengur (1993-1994)[16]; "Experimental Capture of Sardines by Means of Purse Seining" by the Vessel Lolitin (1994)[17]; and "The Experimental Capture of Giant Squid (*Ommastrephes bartrami*) etc." by the B/P Orense[18] (1995).[19]

Presently, an experimental project of fish aggregating device (FAD or "Payao") and/or artificial reefs is being carried out with the cooperation of Japanese experts. Several strategies for fisheries development have been proposed with a basis on these resources and experimental capture studies. This section summarizes the results of previous studies, recommendations, as well as the current situation according to the species of fish. The scientific names of the fish are indicated, since many of the local common names are not accepted in other places (see appendix for details).

(1) Small Pelagic Fish

Table 4-11 Results of the Study of Small Pelagic Fish Stocks

Ships	Species	Results
B/I Nansen (Trawling)	Anchovies (Engraulids) Sardines (Clupieds)	24,000 MT(estimated fishery resources) 26,000 MT(estimated fishery resources)
B/I Fengur (Trawling)	Anchovies (*Anchoa argentivittata, A.nasusu)*	Max. catch 1.1 MT/hour Average 200 kg/hour
Lolitin (Purse Seining)	Sardines (*Ophistonema liberate, O. medirrastre, O. bulleri, Arenque plateado, A. bolillo*)	Max. catch 40 MT/per operation Average 6.45 MT/per operation Capture potential: between 40 and 60 MT/day

Taking into account the results of the study carried out by the B/I Fengur, it has been suggested to use purse seining as the commercial fishing method. The study carried out by the vessel Lolitin, suggest potential captures from 40 to 60 MT with five operations a day, initiating commercial operations with two vessels and monitoring this closely. The report affirms that the

[14] Study on fishery resources in the platform of the pacific from Colombia to South of México, 1987, Bergen December 1998.
[15] Rivas E. 1993. Study on non-traditional fishing. Divagro program management of aquaculture.
[16] PRADEPESCA, 1995 Campaign of simulated marketable fishing- carried out with B/I Fengur.
[17] Ulloa J, Pacheco R 1995. Report of the first fishing campaign with seine device for small pelagic fish in El Salvador. PRADEPESCA.
[18] B/P Orense (length 74.8m, width 11 m, height 6,35) it is a fishing vessel leased form private sector.
[19] Ricaurte L. and Pacheco T. 1996. Results of fishing investigations of B/P Orense about *Dosidicus gigas* and *Disosstichus eleginoides* in waters of ZEE from meso American pacific.

vessel did not carry out operations at night, and that large mesh nets were used (2.5 cm), this eliminates the possibility of catching anchovies. Presently there are no commercial purse seine operation for sardines and anchovies.

(2) Medium Pelagic Fish

Table 4-12 Results of the Study of Medium Pelagic Fish Stocks

Ships	Species	Results
B/I Nansen (Trawling)	Jacks (Carangids) Barracuda (Barracuda), Spanish mackerel (Sierra)	15,000 MT (estimated fishery resources) 10,000 MT (estimated fishery resources)
B/I Fengur (Trawling)	Butterfish (*Peprilus snyderi*)	10,000 MT (estimated fishery resources)

The butterfish is the important portion of the catch when capturing Chilean lobster. Artisanal fishers already use this species, but its commercial value is low.

(3) Large Pelagic Fish

Table 4-13 Results of the Study of Large Pelagic Fish Stocks

Ships	Species	Results (240 longline fishhooks)
Falcon and Captain Mack (longline)	Sharks Sail Fish Dolphin fish Yellow fin tuna Sword Fish	717 units/55 operation 347 units/55 operation 49 units/55 operation 46 units/55 operation 3 units/55 operation

At present, offshore shark longlining is well accepted in El Salvador, and they are capturing Ma-hi as well as sharks. The capture of other fish species is currently not being carried out.

(4) Deep Water Crustaceans (Chilean lobster, etc.)

Table 4-14 Results of the Study of Deep Water Crustacean Stocks

Ships	Species	Results
B/I Nansen (Trawling)	Chilean lobster (*Pleuroncodes planipes*) Nylon shrimp (*Heterocarpus vicarious*)	50,000MT or more (estimated fishery resources) 1,100MT (estimated fishery resources)
B/I Fengur (Trawling)	Chilean lobster (*Pleuroncodes planipes*)	35,000MT (estimated fishery resources)

During the experimental fishing carried out by the B/I Fengur, 90% of the operation resulted in a capture more than 200 kg/hr, which suggests that this fishery has a definite potential.

The industrial fishing of Chilean lobster began in 1979, with a fleet of 8 vessels and continued until 1986. Later on, the number of vessels decreased to one or two. Presently no vessels are fishing Chilean lobsters. This situation is due to the failure of developing an export market.

(5) Squid

Table 4-15 Results of the Study of Squids Stocks

Ships	Species	Results
B/I Nansen (Trawling)	Dart Squid (*Loliolopsis diomedeae*) Giant Squid (*Dosidiscus gigas*)	A reserve in the order between 2,600 MT and 3,800 MT was verified (estimated fishery resources)
B/I Fengur (Handlines)	Dart Squid (*Loliolopsis diomedeae*)	Only in two operations the capture was over 200 kg/hour
B/P Orense (Handlines)	Giant squid (*Dosidicus gigas*)	Max. catch 84 kg/hour Average catch 22 kg/hour

Dart squid is caught as the portion of the catch of commercial shrimp vessels and is already being marketed in the local market. Studies carried out by the B/I Fengur, as well as the B/I Nansen, suggested that there is not a large enough population of dart squid to carry out on a commercial scale.

In accordance with the results of the exploration carried out by the B/P Orense, it is deduced that the potential of commercial fishing for giant squid (*Ommastrephes bartrami*) is very small with ships of similar size to the Orense.

(6) Artificial Reefs and Payaos

Table 4-16 Results of the Study of Artificial Reefs and Payaos

Focus	Species	Results
Artificial reefs of the Coast of La Libertad	Benthos Fish	The fishers report that fishes are attached to the reefs
Fish aggregating devices (FAD's) of Acajutla, and The Coast of La Libertad	Dolphin fish	Yield was increased by 40% more than normal, reaching 2.8 kg/hour. A capture of 250 units/operation has also been reported

4.2 Challenges of the Artisanal Fishery

4.2.1 Development of underutilized Resources

Presently, more than 13,000 artisanal fishers are fishing along the Salvadoran coasts using more than 6,000 boats. Stocks of demarsal fishes along the Salvadoran coasts are less abundant than neighboring countries. This is a result of different reasons including industrial shrimp fishing, and a clear tendency of over-exploitation of resources along the coasts and estuaries.

On the other hand, it is estimated that there are populations of approximately 50,000 MT of small pelagic fish including sardines and anchovies, and 15,000 MT of jacks (Carangids), mackerel, and other medium pelagic fish. There are also large populations of skipjack, yellow fin tuna, dolphin fish, marlin and other large pelagic fishes. Additionally, a large stock of Chilean lobsters exists in the deep sea. Nonetheless, commercial fisheries have not been developed for these species. Among the demarsal fish, it was found that conger eels caught as by-catch during shrimp trawling or artisanal longlining are not well utilized as a commercial product.

The underutilization of these resources is due mainly to the absence of an established market and/or the low prices for these species. Many of the studies carried out in the past assumed the development of industrial fishery using large research or industrial ships. For this reason, the investment to acquire vessels and the construction of new processing plants would not be profitable if it is not certain that large resources would be captured. It will also be necessary to take into account pelagic fish, which are highly migratory and seasonal resulting in difficulties for fishers to live off the capture of these resources.

However, with coastal stocks of shrimp and demarsal fish at all time lows, the introduction of appropriate techniques that take advantage of underutilized resources efficiently by artisanal fishery is becoming an urgent task. If the demand of fish increases through new forms of cooking and processing techniques, it could offer the market law cost raw material. For this reason, utilization of under- exploited resources is the key to diversification and sustainable development of the artisanal fishing sector.

4.2.2 Reducing Production Cost

Fuel represents a high percentage of production costs for artisanal fishers. Reducing fuel consumption can significantly reduce production cost. In the short term, training should be conducted to educate fishers on the appropriate mix of fuels, oil application, maintenance of outboard motors, increase the efficiency of the motors. In addition to prioritized efficiency

rather than speed when selecting a motor.[20] This can be carried out by combining political incentives and by deferring the payment of taxes. At the moment, four vessels with small inboard motors are carrying out longlining for sharks. Before expanding artisanal fishing to the offshore, it is considered that 28' to 34' vessels with inboard motors are the most appropriate. Since some owners possess up to 20 artisanal fishing vessels, plans to offer low interest loans as an incentive to convert existing boats to those with inboard motors, are being made.

Another form of reducing production costs is to increase fishing efficiency. Creating a new fishing grounds by means of constructing artificial reefs as well as developing under-utilized resources are some methods. The experimental installation of FADs and artificial reefs constitute an important effort to demonstrate this potential. There have been some examples of artificial reefs in the past. For example, CENDEPESCA submerged old vehicles in La Union. Some fishers also dismantled a wrecked ship in the Bay of Jiquilisco. These elements served as artificial reefs to a certain extent. In another case, a commercial ship, which sank off the coast of Los Cóbanos, has become a good fishing area. Recently, Japanese experts installed artificial reefs, conformed of concrete tubes in the Libertad Coast. It has also been reported by fishers that the reefs installed in the present Development Study has contributed to the gathering of demarsal fish.

Regarding the FADs in Acajutla, it has been demonstrated its impact with a 40% increase in the capture of dolphin fish (2,5 kg/hour). Although, the positive effect of the FADs has been demonstrated, it has not been disseminated due to thefts of floats and ropes. In addition, due to the fact that floating reefs are installed near the coast and the fish caught has little commercial value, is not enough incentive for fishers to install reefs with their own resources.[21] Furthermore, it needs to comply with the norms of artificial reefs and FADs. The next step is to look for solutions to these problems and encourage the installation and maintenance of these structures by themselves.

It is also useful to begin the use of fish finder and GPS to increase fishing efficiently. Locating fish schools with a fish finder, noting the depth and bottom contour can result in significant increases in fishing efficiency. In the same way, use of the GPS allows fishers to pinpoint fishing areas, thus decreasing fuel usage. However, it is also necessary to take into account that improving fishing efficiency may increase the risk of overexploiting the resource. With this in

[20] Simultaneously with education, the State plans to apply diverse incentives, such as the total or partial exoneration of taxes for outboard motors in artisanal fishing vessels, gasoline taxes, etc. These measures should be examined carefully taking into account its coherence with the macroeconomic policies.

[21] As an exceptional situation, a group of fishers from Barra de Santiago has installed a simple artificial reef with a low cost that consists in sinking palm tree trunks with razor around. This device had as an objective to block the illegal operation of shrimp trawling boats in the coast, and there has been certain success, some boats could not fish because nets were trapped by the artificial reef.

mind, it is critical to promote diversification of fisheries, and to educate fishers as well as to strictly monitor fishing activities.

4.3 Current Situation and Challenges of Training Programs for the Fishers

4.3.1 Current Situation of Fishers Training

CENDEPESCA had trusted to the fisheries cooperatives, the operation and maintenance of the equipment and materials given by the Project of Promotion of Artisanal Fisheries Activities implemented by Japan in 1996 (Project Japón/GOES). Fisheries cooperatives were also allowed to offer appropriate training to their partners. Each cooperative tailored the training to their own needs, and the costs were financed from part (15%) of the revenue obtained from the rent of the equipment. The training covered various topics: administration and activities of the cooperatives, accounting, the partners' motivation to participate, leadership, navigation skills, lamination of fiberglass boats, maintenance of motors, freezing techniques, quality control, etc. Japan continued to offer cooperation through the Japanese experts on topics such as the repair of diesel motors, and processing techniques. The Federated Association of Artisanal Fisheries Cooperative of El Salvador (FACOPADES) also provides training to its partners.

4.3.2 Current Situation of Fishery Education

La Union Institute (high school) offers general and specialized education. It offered courses to the fishing industry until 1996. The Institute had a workshop for vessel construction, workshop for the preparation of fishing gear, ice machines, a cannery, machine workshop and a swimming pool. With these facilities, the institute offered three courses: (1) Navigation and Fishing Techniques, (2) Engine and Vessel Assembly, and (3) Fish Processing and Marine Biology.

At inauguration in 1973, the Institute had 150 students, and was the only fisheries school in Central America at which students from different countries of the region converged. However, student enrollment decreased year after year, due to little employment opportunities after graduation. In 1996, there were only eleven students, and the Institute was forced to close the course. The infrastructure had been abandoned when the Study Team visited in October of 2000; the machinery and tools were inoperative due to theft of the motors. The research vessel was also found to be inoperative because the equipment was stolen while the craft was at dockside.

4.3.3 Tasks

It is doubtful whether the Salvadoran fisheries sector requires a large number of technically

trained personnel, and from previous experiences, there is a low demand for permanent educational centers such as the Institute of La Union. Although it is certain that in order to carry out offshore fishing in the future, the fishers will require technical training in open sea navigation. The most logical plan would be to recruit crews from shrimp trawlers, or to send trainees to educational institutions of neighboring countries, including the Nautical Fishing Center of Costa Rica.

Current training programs for artisanal fishers attained the needs of the fishers. However, since the courses mainly focus on members of the cooperatives, the accessibility for a majority of the independent fishers (95%) is limited. This plan addresses the need to incorporate training programs for the independent fishers. It is expected that once the local offices of CENDEPESCA are strengthened, they will coordinate the training courses. It is expected to increase interaction between the CENDEPESCA's personnel and the fishers and to maintain close communication and information exchange between the two parties.

Chapter 5 Fisheries Management

5.1 Present Status and Problems

5.1.1 Legislation in Force and Drafting of the New Fishing Law

The previous Fisheries Law of El Salvador was passed in 1981 and is the oldest in Central America. Concerning fisheries management, the clauses of the old Law (supervision and control) refer to fishing permits and authorizations (Fishing Law Regulations, Article 3), competent authorities (Article 7), fishing restrictions based on the length of fish (Articles 12 to 14), restrictions to fishing gear (Articles 15, 26, 87 and from 90 to 93), infringements and penalties (Articles 98 to 119), etc. Nevertheless, in addition to not including the conception of the United Nations' Third Convention on the Law of the Sea, this law is inconsistent with reality. Consequently, a new bill is being drafted. In this context, the new Fishing Law prepared since last year was presented and ratified in December 2001 at the national assembly.

The differences between the previous and new Fishery Laws are presented here from the perspective of fishery administration. To better understand the elaboration of this law the problems of the former law are raised.

Main problems of the previous Fishing Law in force

① Provisions addressing the development of underused resources are insufficient
② When a vessel with a Salvadoran flag (including foreign owners) operates illegally in a foreign country, the penalty is enforced on El Salvador
③ Even when the resources are overexploited, the General Director of CENDEPESA is able to grant fishing licenses at his discretion[1]
④ Fishing licenses can be kept by people with insufficient economic capacity[2]
⑤ Lack of controls for the resale of licenses[3]
⑥ Prohibition of catch transship
⑦ Fines applied to the illegal operation depend on the free will of the General Director of CENDEPESCA and due to a lack of sufficient regulations

In summary, the main problems of the former law consist of the "maintenance of the fishery order" and "resource management of fisheries". In contrast, the new law is coherent with the basic national fishery policy already made public. The concrete topics

[1] There are no restrictions to the number of concessions.
[2] Shrimp fishing boats may obtain the concession by paying US $1,000 per boat.
[3] Due to the price of the fishing license and to the lack of resale control, in case CENDEPESCA puts restrictions to fishing rights, those individuals not interested in fishing could sell its right to a third party.

are discussed below indicating in parenthesis the articles in the new Fishery Law. The aspects that are mentioned below but not included in the new Fishery Law, will be stipulated in its regulation.

Basic guidelines of the new Fishing Law

① Policy decision-making to be based on the participation of the relevant sartorial actors. (Articles 11, 12)
② Adoption of the concept formulated by FAO on "Responsible fisheries".
③ Regulations and concession of fishing permits consistent with the results of resources inventory and monitoring. (Article 17)
④ Publication of study results. (Article 20)
⑤ Definition of incentives for fishing resources researchers.[4]
⑥ Decision-making on closed-season policies and closed areas with the participation of the various actors. (Articles 28, 29)
⑦ Definitions of sport fishing permit rates (with or without commercial purposes). (Article 64)
⑧ The conditions of the resources, power and age of the vessels are to be considered in the system of authorization for the application of replacement of old ships (particularly shrimp trawlers). (Articles 35, 40)
⑨ Definition of the obligation to mark the fishing gear during the operation in order to facilitate their identification.
⑩ Concession of licenses for the development of underused resources through public subscription and bidding. (Articles 55 to 57)
⑪ Replacement of the license concession system; license will be attached to a ship instead of the ship owner. (Article 58)
⑫ Prohibition of the concession of fishing permits involving species under high pressure of capture. (Article 73)
⑬ Legalization of penalty amounts[5] (Articles 74 to 84)

Needless to say, the socioeconomic and natural environment of the Salvadoran fishing sector has been going through sudden changes in the last years. It is due to deterioration of resources and environmental conditions of the coast, increased pressure of catches caused by the increase in the number of artisanal fishers, and the backward development

[4] Incentives refer to financial assistance, recognition, etc to people who dedicate themselves to the study of fisheries resources at universities, NGO's and others.

[5] Penalties will be defined not by means of specific amounts but by means of a formula: minimum wages (of the year in which the infringement occurred) – Rate of conversion. The rate of conversion is defined based on the number of employees of the corresponding company. In this way, there will be fair enforcement conditions on artisanal as well as on industrial fishermen. The amount of the penalty which applies to artisanal fishermen will be defined classifying them in different categories according to the value of the boat, that is, the type of motor (outboard, onboard) with or without motor, number of boats, etc.

of underused resources in comparison to the neighboring countries. The above-mentioned issues are indispensable for fisheries management required in the next coming years.

In addition to this, other relevant characteristics of the new law are: the definition of terminology to facilitate the correct interpretation of the law; institutionalization of registries (fishing vessels, fishers, fishery products traders); the use of state revenues (rates for the expedition of licenses, etc), formation of funds for fisheries development; and the demarcation of resource preservation areas. The abolition of the article in the old law that prohibited trawling in three nautical miles is also important although it was opposed by artisanal fishers.

It can therefore be asserted that the new Fishery Law legally supports eco-friendly fishing (pro-resource conservation) from a global standpoint. At present, regulations for this law are being elaborated.

5.2 Resource management

The management of resources is conducted in three ways: governmental management, community management and “co-management” (joint management). At present, both industrial as well as developing countries are focusing efforts on co-management since governmental management is not feasible it is extremely costly and community management requires a long start-up. El Salvador is not an exception. The overall situation of the management of resources as well as shrimp fishery optimization, which constitutes the most important resource of the country, are described below.

5.2.1 Current situation of management of resources

(1) Management of resource activities with fisher initiatives

The settlement located in the border with Guatemala (Barra de Santiago) and Los Cóbanos in the nearby area of Acajutla, the sole commercial port of the country, can be mentioned as examples of communities aware of the need to carry out and who are carrying out resource conservation activities. Similar activities are carried out in other fishing communities. Below is a brief summary of these activities. For further details, refer to Chapter 8.

Barra de Santiago

In this community there is a relatively large estuary and some groups of fishers. One of these groups prepared and placed concrete blocks at the mouth of the estuary, at their own cost, to control the operation of shrimp fishing boats.

Los Cóbanos

This is one of the few communities of the country with a rocky reef sea bottom. The fisheries cooperative of this community has plans to divide into two areas by placing buoys: one for operations and another for closed for the off-season. The consent of non- associated fishers is required to execute this plan.

Isla de Méndez

There is a women fisher's cooperative engaged in cultivation of ark shells (*Anadara spp)* under the supervision of JICA experts and financial resources from small projects of the Japanese Grassroots Grant Aid Scheme. The extracted juvenile shells are placed in an area of the beach that has been enclosed with a net in order to use them when they reach a specific size. These resources are watched during the night by guards or are kept in locked baskets because the shellfish were stolen at the beginning of the project. A similar project of cultivating ark shells (*Anadara spp)* is also in progress in Barra de Santiago.

El Majahual

El Salvador has the highest oyster consumption in Central America. However, the uncontrolled extraction by fishers of the area drastically reduced oyster resources in the coast. At present, the country has been obliged to import oysters from its neighboring country, Nicaragua. In 2001, a group of fishers were organized in El Majahual in order to conserve the oyster population. This group requested CENDEPESCA to prohibit the catch of this shellfish in specific rocky areas under the self-management system and to regulate the catch of oysters of a specific size. In other words, the group requested the administrative order to keep control. However, the previous good relationship between this group and CENDEPESCA was affected by the prohibition of the catch and consumption of shellfish at the end of 2001 due to the red poisonous plankton tide, as it caused economic instabilities for fishers.

(2) Response of the administrating institution (CENDEPESCA)

The Fisheries Law set a one-mile strip at both sides of the estuaries and river mouths as well as three miles upstream (2 miles by 3 miles) as resources conservation areas. Among these reserve areas in the east are Garita Palmera, El Cordoncillo, Río Lempa mouth and Jiquilisco Bay. Furthermore, the new Law establishes Los Cóbanos and the Gulf of Fonseca as special reserve areas since they do not have an estuary or river mouth. Also, CENDEPESCA has officially recognized groups of fishers as environmental management entities, particularly the group of Barra de Santiago that is mentioned above.

5.2.2 Optimization of shrimp fishery

(1) Current Status and Challenges

As previously mentioned, shrimp constitutes an important industrial as well as artisanal

fishing catch. However, the volume of the catch has decreased in recent years[6] and the conservation of these resources constitutes a top priority. Optimizing shrimp fishery would have a great economic impact, and it is a challenge for the Salvadoran fisheries sector.

Aside from the decrease of shrimp resources caused by overexploitation, Hurricane Mitch of 1999 greatly affected shrimp fishery. The main cause, according to general opinion is the inflow of a great amount of sediment into the Fonseca Gulf and to different estuaries in the country that are an important habitat for the growth of juvenile shrimp. As the results of interviews indicated that, many fishers mentioned that the year 2000 was the worst record for shrimp fishery. This fact is also clearly reflected in the amount of exports.

While natural disasters cannot be prevented, an effective management system would help in reducing the impact of these disasters. Out of the three shrimp species, white, brown and pink, special attention should be given to the reduction of white shrimp.[7] The white shrimp lives closest to the coast and is captured not only by trawlers but also by the gill nets of artisanal fishers. Fishing control within three nautical miles is therefore the focal point of shrimp fishery optimization.

(2) Reports of the Shrimp Fishing Studies Conducted in the Past

According to CENDEPESCA (1990), MAG established in 1955 optimum size of a shrimp fleet as 43 boats accordingly with the results of experimental operation by Florida type boats made in 1953.[8] In 1959, it was increased to 60 boats according to the results obtained by then. Later on, the volume of the in-shore fishing catch started to decrease gradually. Therefore, the optimum fleet was modified again to 73 boats with the expectation that the catch could be increased by looking for new fishing grounds in the off-shore area. This level was maintained until 1981. Nevertheless, in 1982 the number of operation permits increased to 85 boats and in 1989, to 226 boats.[9]

There are several reports on the optimization of shrimp fishery in El Salvador. Espino (1994) diagnosed the shrimp fishing industry as follows:

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[6] It reduced from US $18million (1999) to US $9million in (2000)

[7] Due to the reduction of white shrimp catch, trawlers are presently catching small shrimp, which are in high demand in the local market.

[8] Ellis (1965) establishes that the optimum fleet size is 47 boats and since there were 73 boats operating he proposed to reduce the number of operating days from 14 to 8 navigation days. Subsequently, Ulloa and Bernal (1981) established that the optimum fleet size is 50 boats with an annual unloading volume between 3,0 and 4.0 million pounds/ accumulated operating days between 12,500 and 13,200.

[9] This coincides with the time in which shrimp fishing with gill nets quickly increased among artisanal fishers.

(1) Upon observing the evolution of the shrimp catch according to species in 1960-1990, the white shrimp catch (*Penaeus vannamei, P. stylirrostris, P. occidentalies*), which is the predominant species, constantly decreased from 2,000 MT to 500 MT. The brown shrimp (*P. californiensis*) experienced a decrease from about 1,000 to about 380 MT between 1960 and 1964, and subsequently, remained constant in the order of 500 MT. The pink shrimp (*P.s brevirrostris*), which lives in a relatively deep zone, remained in the order of 100 MT for the same period.

(2) In the case of white shrimp, although the percentage of artisanal fisheries in the total catch was less than 10% in 1985, it grew rapidly and became about 30% after 1990. This is due to the increase of artisanal fishers catching shrimp due to accelerated migration of the population to the coastal zone as a result of the civil war.

(3) The optimum number of the fleet ranged between 54 to 56 boats in 1960-1979; and between 48 and 50 boats in 1980-1993, applying the production model (Schaefer, 1954).

(4) Due to the characteristics of the tropical seawaters, the spawning season lasts all year even though a specific seasonal behavior is observed. The high maturity season and the increased catch of pink shrimp is identified between June and February, brown shrimp (between June and October and between January and February) and white shrimp (*P. occidentalis* and *P. stylirrostris*, between February and August). In the case of the white shrimp, for the period comprised between 1988 and 1993 the highest spawning season was in the month of June and the frequency of post-larva shrimp, 8 cm long, coming out from the mangroves to the high sea reaches its peak in November (FAO).

From the resource conservation point of view, many scientists have established that the optimum number of shrimp fishing boats is 50 units and have also mentioned the need to establish a closed season during the period of breeding and growth. A closed season was thus established for a month from April 15, 2002. Although it is true that this measure will not have an impact from a biological point of view, it is highly appreciable since it is the first attempt in Central America to establish a complete closed season for any zone and method of fishing.[10]

[10] In Costa Rica, the closed season was established in the Nicoya Gulf and Panama has had the experience of establishing a closed season between the months of February and April (for 3 months) in the years 1990-1992.

5.3 Fishing surveillance

5.3.1 Current situation of fishing surveillance

In addition to CENDEPESCA inspectors, the Navy and the Marine Unit of the National Civil Police are competent authorities in the patrol and control of fishing activities. CENDEPESCA has assigned 13 inspectors (five inspectors and eight watchmen in regional offices) and four motorcycles, five FRP boats and four outboard engines for this purpose. Their patrolling activities include inspecting jointly with the Navy that, shrimp fishing boats are equipped with turtle excluding devices (TEDs). Surveillance activities also include the search and control of fishing boats and crew that engage in illegal activities. At present, the experimental use of a monitoring system to locate shrimp fishing boats with the use of a transponder (a type of GPS) has been implemented. This system is regarded as extremely useful in controlling navigation by boat owners.

The Navy has 6 patrolling boats, ten 44-feet boats, one 75-feet boat, one 88-feet boat, and one 100-feet boat to patrol the territorial sea and inspect the boat search aside from controlling the illegal operation of shrimp fishing boats within three nautical miles from the coast. The Navy also patrols and controls the unauthorized operation of foreign fishers (Honduran and Nicaraguan) in the Fonseca Bay as well as the unauthorized operation of the national fishers.

It has been noticed that the patrolling of the Navy in the central and western regions is deficient. For example, in the Port of La Libertad in the central region, the Navy jointly controlled with CENDEPESCA inspectors the existence of TEDs, using fishing cooperative boats. However, since some members were receiving the portion of the catch from the shrimp fishing boats, cooperation has decreased in the past years.

While the Navy is mainly focused on controlling the borders, the Marine Unit of the National Civil Police has been created to safeguard the activities that are carried out within territorial waters. It controls offshore narcotics trafficking activities using 14 patrolling cabin boats. To patrol the bays, FRP boats with outboard engines are utilized to sporadically control in cooperation with CENDEPESCA inspectors of illegal operations involving the use of dynamite or poison. Patrolling activities associated with the Environment Law (illegal mangrove deforestation, etc.) imply more responsibility than the patrolling authority has provided for in the Fisheries Law.

5.3.2 Present Status of Illegal Operations (Until the end of 2001 under the previous Fisheries Law)

(1) Operation of Industrial Fishing Boats (shrimp trawlers) within three nautical miles from the Coast.[11]

The former Fisheries Law prohibited trawling within three nautical miles from the coast considering the fact that these waters are important for the growth of fishery resource larvae and post-larvae. However, since these areas are inhabited by an abundant population of white shrimp[12], which are important items for exports, many boats constantly conducted illegal fishing activities in these areas.[13] Shrimp and several other fish species constitute an important fishing ground for artisanal fishers. Shrimp trawlers catch these resources as by-catch, but later discard them with the exception of fish with high commercial value. In this way, they not only deteriorate the habitat of the larvae but also the fisheries resources themselves. Similar problems have been seen in almost the entire Central American region for more than 20 years. It is clear that shrimp trawlers in this area were hardly controlled. In addition, artisanal fishers are suffered from the damage of fishing gear by shrimp trawlers.[14]

(2) Use of Forbidden Fishing Gear by Artisanal Fishers

1) Use of Double-Net for Shrimp

Shrimp fishing with bottom gill nets is common in the coast. Notwithstanding the fact that the Fisheries Law forbids the use of double nets[15], they are intensively used, particularly in the eastern region (from the Jiquilisco Bay to the East). The mesh size for gill nets has been stipulated in 2.5 inches according to the Fisheries Law, but larger amounts of shrimp are caught with the use of double nets. On the other hand, small fish are also caught as by-catch because the size of the mesh is smaller than the size stipulated by the Law. In an interview concerning this issue, most fishers recognized that the practice is illegal but justified this by saying that there is no effective control of the operation of shrimp trawlers either. In fact, CENDEPESCA almost controlled nothing.

2) Net to Catch Sardine Larvae

This fisheries activity is carried out in the Jiquilisco Bay with the use of an extremely

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[11] Although the close season within the 3 nautical miles was derogated in December 2001.

[12] It is said that 65% of shrimp unloading is white shrimp (Ulloa 2000).

[13] During the period of study, shrimp trawlers were found operating within 500 m from the coast (an estimate).

[14] These are mostly damage and theft of gill nets. The extent of the damage is unknown since most of the problems are solved through conversations between the parties.

[15] The new Law explicitly prohibits the use of double nets which was not clearly expressed in the former law.

small type of mesh called “sieve”.[16] Several claims have been filed by the fishers regarding the fishing of shrimp larvae near the shore. As a result, CENDEPESCA conducted investigations and concluded that by-catch was not endangering the reserve. Nevertheless, shrimp fishers are not fully convinced. At the present, this form of fishing has been suspended and is being re-analyzed.

3) Closed Fishing Area and Illegal Fishing Methods.

In addition to the use of fishing gear in estuaries and bay mouth areas assigned as closed areas, illegal fishing methods using dynamite or poison are still common. Although the situation including the number of infringements has not been thoroughly investigated, some communities are willing to keep voluntary control or denounce illegal operations. In other cases, CENDEPESCA inspectors and the police keep control on a collective basis.

4) Catch of Regulated Mollusks

Presently, ark shell (*Anadara spp)* mollusks of restricted size are sold in the market considerably reducing the availability of resources.

5.3.3 Problems in fisheries surveillance

(1) Weak Political Will

There is lack of strong political will to manage fisheries. The reason could be the little perception of the urgency to preserve the fisheries resources and the lack of people’s awareness of the importance of these resources; however, the pressure exerted by industrial fishers in the socio-economic environment cannot be ignored. Consequently, the operation of shrimp trawlers within three nautical miles is practically uncontrolled.

(2) Lack of Social Regulatory Force

There are multiple factors endangering the survival of artisanal fishers such as the damage caused by the operation of trawlers in the coast and illegal fishing in estuaries. Nevertheless, artisanal fishers cannot exert enough social and political regulatory pressure, as they are not well organized.

(3) Lack of Enforcement Capabilities by Surveillance Institutions

1) CENDEPESCA

a) Five fishing inspectors are legally authorized to exercise control are required to work along with the Naval Force or the Police since they do not carry weapons.

[16] The Fishing Law in force stipulates the mesh size. However, in cannot be controlled given the high number and diversity of fishing methods.

b) The transportation means used by the inspectors and watchmen are deficient and many times inspectors are forced to use public transportation to conduct their activities. Added to this is the lack of budget to cover fuel expenses, preventing efficient surveillance activities.
c) Many inspectors and watchman come from areas where they work. This can be an advantage in some aspects; however, there are watchmen who have not completed their compulsory education and are not prepared to draw up a report by questioning a violator.
d) There is a lack of personnel and budget to define the shrimp closed season and area and to carry out the subsequent necessary studies and monitoring.

2) Naval Force

The management of marine areas is very little with the exception of the Fonseca Bay. Due to lack of budget, surveillance is concentrated in a few areas despite a sufficient number of surveillance boats.

3) Marine Unit of the National Police

a) It is said that the National Police has more budget for surveillance than the other two institutions. However, half of the patrol boats (14) introduced for surveillance are not in operating conditions.[17]
b) The main surveillance in estuaries is to control compliance with the Law of Environment (mangrove deforestation, etc.) and the activities associated with the Fisheries Law are very few.

5.4 Fishery administration Topics

Upon analyzing the current situation with resources management and fishing patrolling examples, the former Fishing Law included fisheries management-related provisions but did not establish a management system to carry out this task. Therefore, management was limited to providing support to some groups of fishers who were aware of the critical situation and started incipient fishery management activities. The following is a summary of the present difficulties in promoting an eco-friendly fishing operation with resources management under the new Fisheries Law.

1) Underdevelopment of Fisheries Organizations

Almost all Salvadoran fishers are aware of the depletion of the fishery resources. However, very few fishers have started resources and fishing ground conservation activities on their

[17] This situation is due in part to the lack of power of the patrol boats for persecution since they are remodeled recreational boats very sensitive to the effects of high waves. It is also due to the lack of resistance of the transmission system, including the propeller, and to the lack of maintenance.

own initiative and community fisheries management is still incipient. Many fishers are doubtful of the effectiveness of this type of activity. Furthermore, most existing fishers' cooperatives are on the verge of bankruptcy, or are declared bankrupt. There are no cooperatives with sufficient capacity to implement a resources management project.

2) Lack of scientific data

A resources management plan should be based on the results of a convincing scientific study on existing resources. However, there are hardly any resource inventories except for species such as shrimp. It is also very difficult for CENDEPESCA to gather and analyze the data as execution of the inventory study is costly and the institutional staff has been downsized due to restructuring.

3) Lack of CENDEPESCA's capacity

The operation of the CENDEPESCA Fisheries Management Unit focuses on legal management activities such as fishing records, license control, fisheries control, etc. according to the New Fisheries Law. This Unit does not have sufficient capacity to conduct management activities including resource management, which is required in the future.

4) Shrimp fishing boats

The problems with the operation of shrimp fishing boats are demonstrated in conflicts with artisanal fishers but also in the degradation of larva, fry and small fish habitat and in the deterioration of sea conditions in general. On the other hand, El Salvador is the highest consumer of the by-catch of shrimp fishing boats. In fact, the portions of the catch are utilized by artisanal fishers as valuable resources. Consequently, there is a "twist" in terms that not all artisanal fishers are against the operation of shrimp fishing boats. Additionally, in view of the State's financial limitations, difficulties are foreseen in strengthening the Navy's fishing control system.

Taking into account the aforementioned problems, aspects that should be considered in the design of the fisheries management plan are described below:

1) Shrimp fisheries management has several components: biological, ecological, social, geographic, relevant institutions, etc. Thus, the forms of management are intricate.
   ① A strong conflict of interest between industrial and artisanal fisheries;
   ② Mangroves where shrimp post-larvae grow is the jurisdiction of the Ministry of the Environment;
   ③ Shrimp is a species that reproduces annually;
   ④ Fisheries resources are widely distributed along the coastline.

2） Fishers' groups similar to those of Barra de Santiago emerging in the next coming years. This probability is particularly high in the fishing communities with beaches that have been set apart as fishing grounds reserve areas pursuant to the new Fisheries Law. Many of the fishing communities with open-sea access must compete with shrimp fishing boats and will try to place obstacles to hinder the operation of the shrimp fishing boats. Nevertheless, if an artificial reef is built instead of the placement of obstacles, this action would contribute to fishers awareness of the need to strengthen the fishing grounds.

3） A high percentage of shellfish extraction in comparison with the neighboring countries. Shellfish have been considered the easiest fishery resource to handle, as migration is very low. Therefore, it is easier for CENDEPESCA to plan their management compared to other fish species.

4) Fisheries management should be based on the "co-management" concept aside from the conventional patrolling to be carried out by the Navy or the Police under the "top-down" system. It should include coordinated and meticulous actions combining the different fisheries resources, fishing and catch grounds management methods taking into account the different social factors of the fishing communities as well as the ecology, the conditions of the fishing area, and the fish catch to be managed.

Chapter 6 Fish Marketing and Processing

6.1 Present Conditions

6.1.1 Fish Products Supply

Fisheries in El Salvador can be divided into four sub-sectors: (1) coastal artisanal fisheries; (2) industrial fisheries; (3) inland (continental) fisheries; and (4) aquaculture. According to the available statistical data of CENDEPESCA, the total fish production volume from these sub sectors increased from about 8,362 MT in 1986 to a maximum volume of 14,999 MT in 1995 and dropped to 9,755 MT in 2000. The decline in 1999 is attributed to hurricane "Mitch" in 1998, which adversely affected the fisheries sector. Inland fish production increased from 1,816 Mt in 1986 to about 4,000 to 5,000 MT from the late eighties to mid nineties, and dropped to 2,830 MT in 2000.

(1) Marine Production

Marine production is from two sub-sectors, namely industrial and artisanal fisheries. The total marine fish production in 2000 was 6,665 MT, of which 2,099 MT (31%) came from industrial fishery, and 4,566 MT (69%) from artisanal fishery. Industrial fisheries target mainly prawns and shrimps that accounts for 86% of the total industrial production. On the other hand, artisanal fish landings of individual fishers were 4,320 MT (95%) and fishers cooperatives 246 MT or 5% of the total artisanal fish landing. In terms of catch composition, shrimps represented about 4% (176 MT), mollusks 24% (1,114 MT) and the rest was fish varieties 72% (3,276 MT). The fish varieties are grouped into species of snappers, croakers, Spanish mackerel, catfish, sharks, and other fish.

(2) Continental Fishing Production

The total production of continental fishing in 2000 was 2,830 MT. Tilapia nilotica is the major share in continental fish production, at 41% (1,171 MT) in 2000, followed by 30% (860 MT) of Plateada species (tetra fish), Guapote (a species of tilapia) with 11% (324 MT), catfish with 5% (142 MT), etc.

(3) Aquaculture Production

Aquaculture production is still incipient at 260 MT. The predominant specie is the white shrimp (*Panaeus vennamei*) at 191 MT (73%). In addition, freshwater fish (tilapia) with (56 MT or 22%) and freshwater prawn (*Macrobrachium spp.)* (9 MT or 3%) are also cultivated

6.1.2 Export and Import of Fish Products

(1) Export of Fish Products

Table 6-1 shows that the export volume of fish products fluctuated from 3,378 MT (US $23.83 million) in 1991 to a peak in 1996 with 6,984 MT (US $52.9 million) and declined to 2,518 MT (US $18.4 million) in 2000 (Table 6.13). Exports primarily consist of frozen shrimps; which represented 1,525MT (60%) of the total export in 2000, while fish products comprised only 364 MT or less than 14%. The exported fish products are destined mainly for the US.

Table 6-1: Export of Fish Products (1991 - 2000)

(Unit: Quantity in MT & value in US $1000)

	1991		1992		1993		1994		1995	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Crustaceans										
Shrimp	2,412	19,481	2,272	18,644	2,343	18,461	4,089	31,276	4,537	35,065
Small Shrimp	227	1,190	407	1,775	250	1,040	32	130	129	1,624
Others Crustaceans	0	0	0	0	4	29	14	99	80	166
Sub-total	2,639	20,671	2,679	20,419	2,597	19,530	4,135	31,505	4,746	36,855
Fish										
Fish Fillet	122	339	190	943	162	564	11	74	5	35
Fresh Fish	506	1,578	189	642	940	1,294	1,243	3,345	580	1,419
Shark fin	25	819	24	1,142	9	344	34	1,535	20	1,480
Dry fish	19	51	996	121	12	135	4	31	5	28

	1996		1997		1998		1999		2000	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Crustaceans										
Shrimp	6,611	48,060	3,507	29,328	3,852	28,449	2,594	23,260	1,525	13,091
Small Shrimp	15	23	0	0	62	97	45	66	19	24
Others Crustaceans	18	110	6	55	18	169	46	315	155	1,201
Sub-total	6,644	48,193	3,513	29,383	3,932	28,715	2,685	23,641	1,699	14,316
Fish										
Fish Fillet	5	11	122	556	23	134	42	549	68	603
Fresh Fish	247	609	0	0	453	1,131	52	259	226	1,073
Shark fin	27	1,718	19	1,376	13	620	11	868	19	1,051
Dry fish	13	50	25	118	6	45	12	129	51	418
Sub-total	292	2,388	166	2,050	495	1,930	117	1,805	364	3,145
Sub-products (Shark)	37	95	99	505	194	393	50	284	90	171
Others	10	2,262	15	2,404	170	2,098	278	1,524	365	789
Total	6,983	52,938	3,793	34,342	4,791	33,136	3,130	27,254	2,518	18,421
Sub-total	672	2,787	1,399	2,848	1,123	2,337	1,292	4,985	610	2,961
Sub-products (Shark)	0	0	0	0	0	0	153	222	161	551
Others	69	379	30	326	5	508	19	2,098	154	12,571
Total	3,380	23,828	4,108	23,593	3,725	22,375	5,599	38,810	5,671	52,939

Remarks: The exports of yellow fin tuna in 1998 and 1999 of 241 Mt and 3,579 Mt, respectively, are excluded, as it is not indicated in the total fish production.

Source: CENDEPESCA and Quarantine Division of Ministry of Agriculture and Livestock

There are about 22 major exporters in El Salvador (Table 6-2), of which a majority are owners of processing plants and shrimp trawlers. The shrimp trawlers are the main source of their raw materials. However, a quantity of shrimps landed in the artisanal sector are exported by major wholesalers based in Tiendona using the processing and cold storage facilities of the industrial plants.

Table 6-2: List of Exporters

Name of Firm	Type of Products
1 FACOPADES	Fish and Frozen shrimps
2 Maria Isabel Rivera de Velasquez	Fish and Frozen shrimps
3 NERIMAR	Fish and Frozen shrimps
4 Laboratories PESCANOVA	Nauplius and post larvas
5 Grupo MAR AZUL	Fish and Frozen shrimps
6 VERALMAR	Fish and Frozen shrimps and lobsters
7 EXPORCASA	Fish and Frozen shrimps, lobsters, caracol
8 Juan Francisco Morales	Fish and shark
9 Grupo PRESTOMAR	Fish and Frozen shrimps, lobsters, chitin
10 PROCEMI/SWISS CHEMICALl	Fish and Frozen shrimps, lobsters, chitin
11 INDUMAR	Fish and Frozen shrimps
12 Grupo ATARRAYA	Fish and Frozen shrimps
13 ISMARSA	Fish and Frozen shrimps, tuna and by-products of shark
14 SALVAMAR	Fish and Frozen shrimps
15 SAMSA	By-products of shark
16 FUNDAUSULUTAN	Frozen shrimps
17 ACOOPUERTO	Fish and Frozen shrimps
18 TIBURON PINTO	By-products of shark
19 MISSION ENTERPRISE	Frozen shrimps
20 PESQUINSSA/CAMINSSA	Fish and Frozen shrimps
21 TECNOAQUA	Ornamental fish and frogs
22 FORMOSA	Fish, by-products of sharks and white tuna

Source: CENDEPESCA, MAG

(2) Import of Fish Products

From Table 6-3 it can be appreciated that imports of fish products also fluctuated from 390 MT (US $0.15 million) in 1991 to 7,013 MT (US $6.338 million) in 1994 and gradually dropped to 3,837 MT (US $5.87 million) in 2000. Imported products are primarily canned sardines and tuna from Costa Rica, Peru and Mexico; and in terms of their total import value, it is less than the earnings of exported products. There are a number of importers classified into two categories; the first category is the individuals (wholesalers), restaurants, hotels, and supermarkets that import products such as imitation crabs, smoked salmon, etc. catering for the urban market. The second category is the major importers such as DISNA and COMMERICAL, which entirely import most of the canned sardine, tuna, and fishmeal.

Table 6-3: Import of Fish Products (1991 - 2000)

(Unit: Quantity in MT & value in US $1,000)

	1991		1992		1993		1994		1995	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Canned fish	355	100	22	67	2,729	4,085	1,713	1,678	2,861	4,144
Other products	35	48	791	286	4,362	4,284	2,253	1,856	1,259	1,155
Total	390	148	813	353	7,013	6,338	6,076	3,534	4,119	5,299

	1996		1997		1998		1999		2000	
	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value	Q'ty	Value
Canned fish	2,469	3,411	2,248	3,529	3,047	2,008	3,550	4,657	2,672	3,865
Other products	977	1,075	889	1,268	738	784	1,765	1,434	1,165	2,004
Total	3,446	4,485	3,138	4,797	2,792	5,315	3,785	6,091	3,837	5,869

Remarks: Canned fish is mainly canned sardines and tuna.

Source: CENDEPESCA and Quarantine Division of Ministry of Agriculture and Livestock

The total supply based on the CENDEPESCA statistics of 2000 was 13,592 MT; of which 9,755 MT (72%) correspond to the national production while the other 28% (3,837 MT) were imported fishery products or canned fish (2,672 MT). The demands of fish products, of which 11,074 MT (81%) were consumed domestically and the remaining 2,518 MT (19%) were exported. Export was comprised of 61% (1,525 MT) of frozen shrimps and 14% (368 MT) of fish products.

(3) Fish consumption per person

The total volume of the fish products supply for 1999 and 2000 has been calculated based on CENDEPESCA statistics and by dividing this value by the total population of El Salvador the annual per capita consumption of fishing products was estimated. As observed in Table 6-4, the total supply of these products in 1999 and 2000 was 9,394 MT and 10,826 MT, respectively, and the annual per capita consumption was 1.53 kg/year and 1.72 kg/year, respectively (Table 6- 5).

Table 6-4: Total Supply of fish product (1999-2000)

Destination	Total Supply (kg)			
	1999		2000	
Domestic Production	+	13,633,993	+	9,755,157
Imports	+	2,791,812	+	3,837,127
Exports	-	6,708,971	-	2,517,956
Subtotal		9,716,834		11,074,328
Inedible	-	322,496	-	248,506
Total		9,394,338		10,825,822

Source: CENDEPESCA. The export volume also includes yellow tales

Insert Table 6-5: Annual consumption of fish products per person (1999-2000)

Items	1999	2000
Total supply	9,394,338	10,825,822
Total population	6,154,311	6,276,037
Consumption (kg/person)	1.53	1.72

Source: CENDEPESCA and the quarantine department of the MAG

However, the surveys with buyers at 15 retail markets in San Salvador in 1999 (with approx. 180 samples) showed that the annual fishing product consumption per inhabitant was about 8kg.[1] The team of the present Study carried out a supplementary study in October 2000 to verify the accuracy of this survey. This study was to determine the volume of fish marketed in one day in 11 of the main rural markets throughout the country, based on interviews. The total monthly consumption was estimated, then divided by the population of the corresponding eleven cities and the monthly per capita consumption was determined.

Table 6-6 summarizes the results. The average per capita consumption in eleven cities of the country was 2,74 lb/month. If the volume of supply (8,449,320 lb) in these eleven markets could represent the total national supply, and may divide into the total population (6.3 million inhabitants), it can calculate an estimated monthly consumption per inhabitant of 1.34 lb (0.61 kg). This is equal to an annual consumption of 16.08 lb (7.32 kg). It is also necessary to consider that the supply of fish products in other cities (or fishing communities), which were not included in this supplementary study, is not low. Furthermore, it is noted that during the month in which the study was conducted (October 2001) the demand for sea products dropped throughout the country due to the Red Tide. Considering these conditions, it is concluded that the annual per capita consumption calculated in this study of 16.08 lb (7.32 kg) is not overestimated.

Based on this estimation, it is estimated that the total volume of the supply of fish products in El Salvador is 101,391,840 lb (approximately 46,000 MT).

This value is four times the total supply in the year 2000 brought by the fishing statistics (10,826MT). The large difference between the two values clearly suggests the need to improve the present method of collecting fishing statistics data. The following figure represents a scheme of error existing between CENDEPESCA statistics and the estimates of the Study Team with the purpose of facilitating interpretation of the text.

[1] However, according to ESANES-88, it is estimated that 49% of the fishing product consumers live in the large cities while they represent less than 39% in other cities and in the rural areas.

Table 6-6: Annual consumption of fish products per person based on the local markets (1999-2000)

Communities	Population	Consumption (lb/day)	Consumption (lb/month)	Consumption per person (lb/day)	Consumption per person (lb/month)
Cojutepeque	53,122	5,295	158,850	0.10	2.99
SanVicente	50,751	2,888	86,640	0.06	1.71
San Miguel	239,039	3,528	105,825	0.01	0.44
La Unión	40,371	11,464	343,933	0.28	8.52
Usultán	69,090	10,098	302,946	0.15	4.38
Zacatecoluca	62,352	1,374	41,220	0.02	0.66
Santa Ana	248,963	1,240	37,185	0.005	0.15
Ahuachapán	107,534	900	27,000	0.01	0.25
Sonsonate	96,772	1,495	44,835	0.02	0.46
Nueva San Salvador (La Libertad)	158,207	3,600	108,0011	0.02	0.68
San Salvador	1,959,000	239,763	7,192,875	0.12	3.67
Total	3,085,200	281,645	8,449,320	0.09	2.74

A. Annual internal consumption of fish products (Estimates of the Study Team)

46,000MT

B. Annual internal supply of fish products (CENDEPESCA statistical data for 2000)

Added in the statistics (10,826MT)	Ton of products not added in the statistics (Three times the data of the statistics)

If the value of the annual domestic consumption of fish products in Graph A is correct, Graph B could show that there would be, approximately 36.000MT of fish products marketed in the country were not counted in CENDEPESCA statistics. They might be broken down as follows: 1) morallas, 2) fresh fish not included in the statistics, and 3) products brought in the country without going through customs.

6.1.3 Fish Marketing System

(1) Distribution Volume and Flow

1) Nationwide Marketing and Distribution

There is no recorded data or information on the utilization and distribution flow of the landed fish catch of artisanal fishery. The industrial fishery sector keeps records of its catches and export quantity of processed products. As shown in Table 6-7, consumption of artisanal produce by department was estimated based on interview surveys of producers, fish traders and fisheries inspectors. The figures are indicative of the utilization of the

landed fish catches. It is estimated that about 6% was consumed locally, 69% were marketed fresh and 24% were processed (salt and drying). The overall distribution flow of fish products is shown in Fig. 6.1 at the end of this chapter. Metropolitan San Salvador is the main area of fishery product consumption in El Salvador.

Of the 2,771 MT of industrial fishery production, 95% were exported, and the remaining 5% distributed locally. Inland and aquaculture production contributed about 2,932 MT, of which about 17% was marketed to San Salvador and 83% to other regions. The import of fish products was 4,007 MT, of which 70% was distributed in San Salvador and the other 30% distributed to other regions.

2) Marketing Patterns in Ahuachapán and Sonsonate Departments

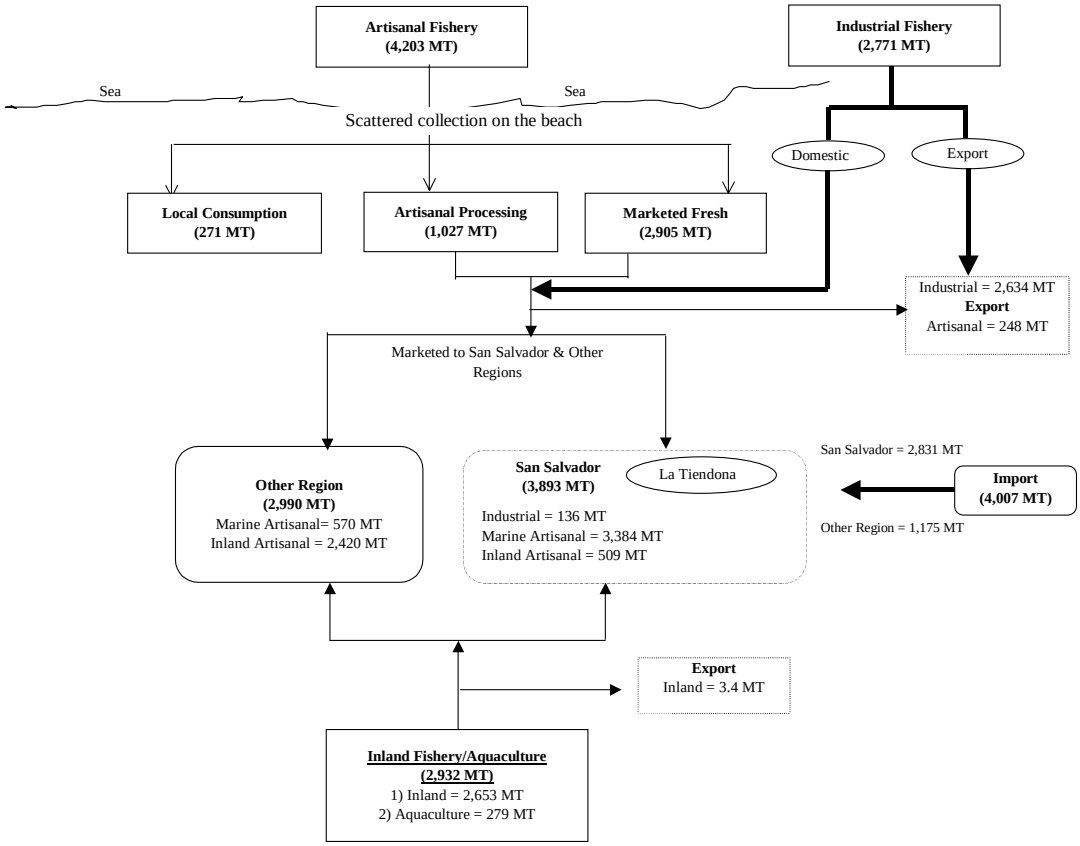
The marketing pattern and volume in Ahuachapán and Sonsonate departments are shown in Figure 6-2 at the end of this chapter. There are basically three marketing routes for the fish landed in these departments. The metropolitan area of San Salvador is the main consumption area, which receives about 82% of the 1,211MT of fish landed in 1999. About 13% of the remainder was distributed to the urban areas of Santa Ana and Ahuachapán through the collection center located in Sonsonate's bus terminal, and the other 5% consumed locally.

3) Marketing Pattern in La Libertad Department

The marketing route and volume in La Libertad department is shown in Figure 6-3 at the end of this chapter. Of the 405 MT of fish landed in 1999, about 60% was marketed to Metropolitan San Salvador, about 20% (83 MT) marketed to other regions. There is also an inflow of fish from other regions to urban La Libertad due to high demand of selected fish species by restaurants and tourists.

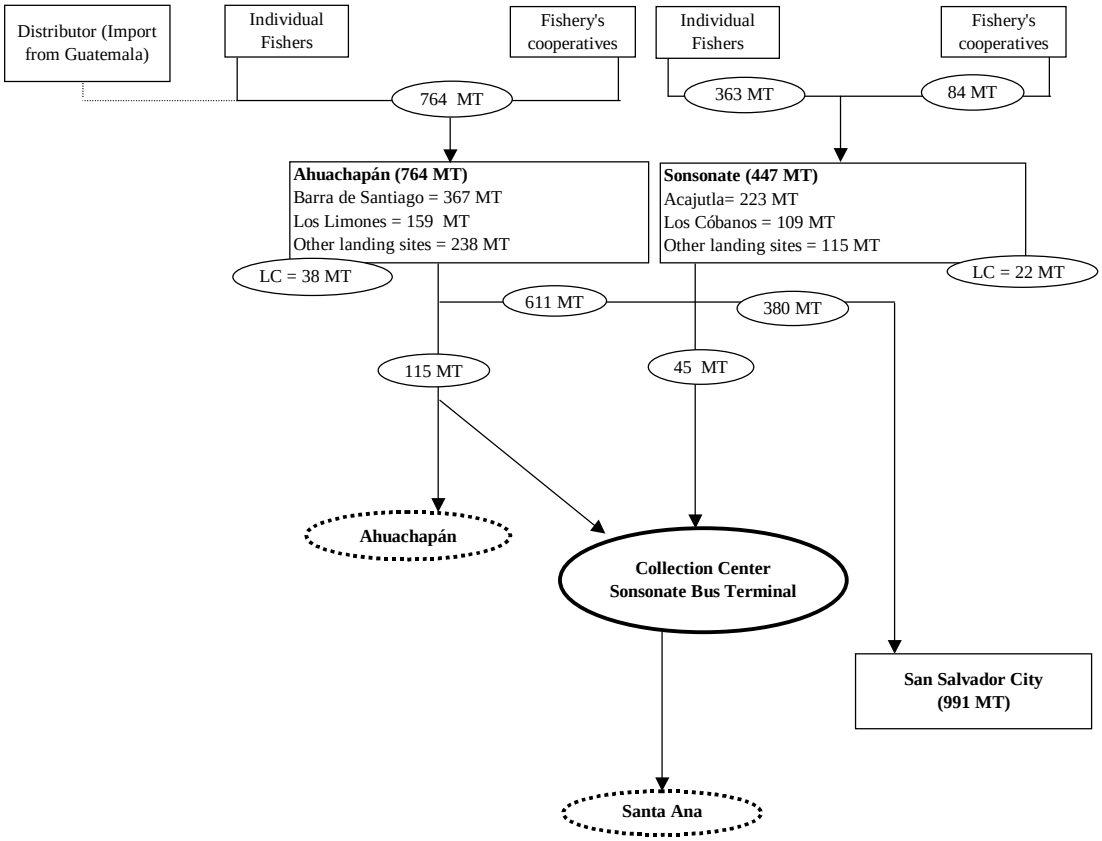
4) Marketing Patterns in Usulután and La Unión Departments

The marketing route and volume in Usulután and La Unión department is shown in Fig. 6-4 at the end of this chapter. The total volume of fish landed in these two departments was 2,141MT in 1999, of which 88% was marketed to San Salvador, 4% to Usulután urban area, 3% to San Miguel urban area and the remaining 5% consumed locally.



Source: Field Survey (The Study on the Development Artisanal Fisheries in El Salvador), Nov. 2000 - Feb. 2001
Remarks: 1) Figures refer to 1999 data of Cendepesca.
2) Import figures are converted to whole fish weight equivalent (wet weight).

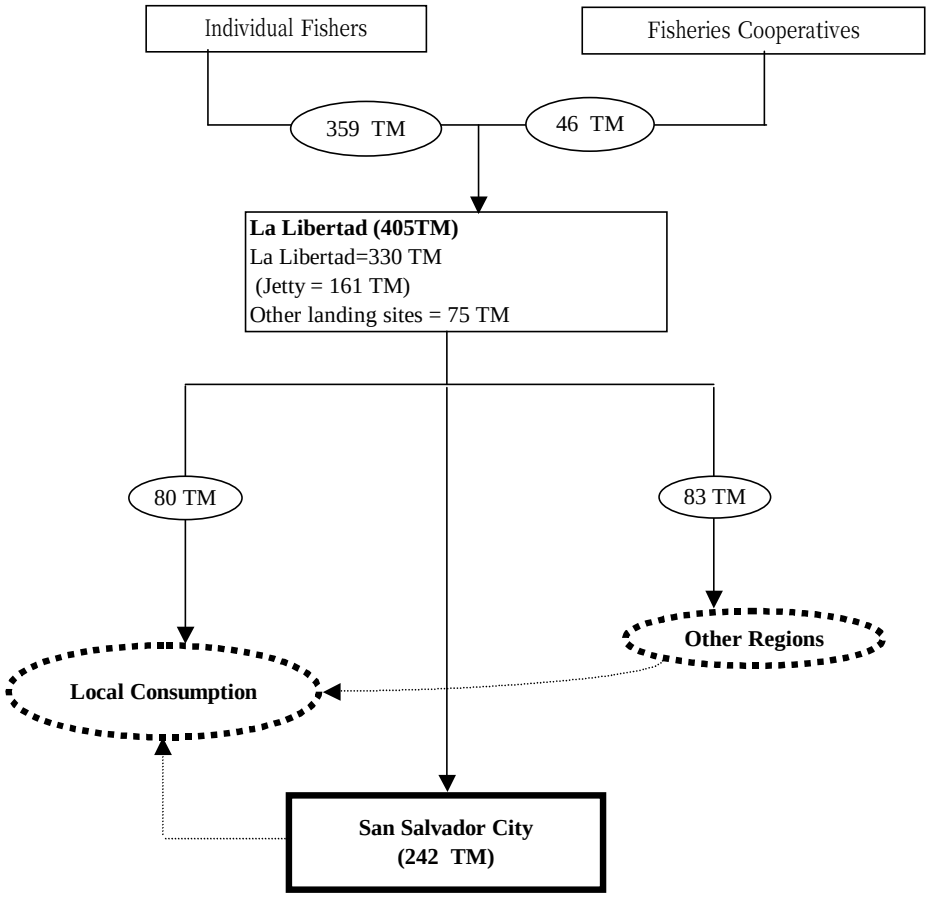
Figure 6-1: Diagram of distribution and volume of fish in El Salvador



Source: Field Study (The study on the Deelopment of Artisanal fisheries in el Salvador), Nov. 2000-Feb. 2001

Remarks: 1) Figures refer to 1999 data of CENDEPESCA.

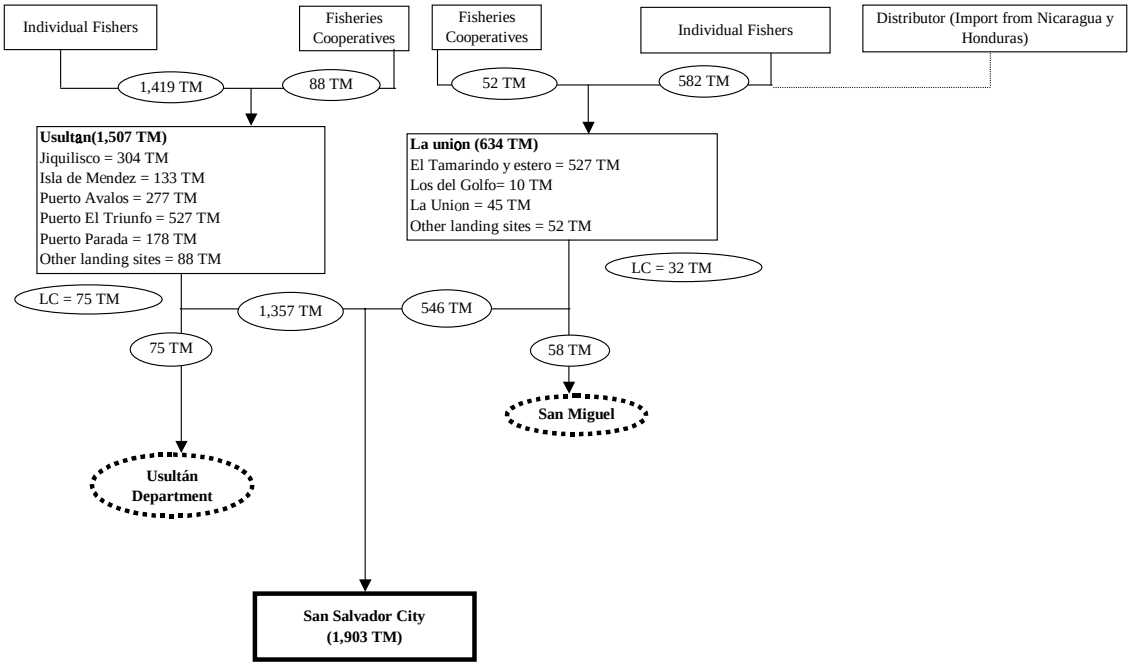
Figure 6-2: Diagram of distribution and volume of fish in the departments of Ahuachapán and Sonsonate



Source: Field Survey (The Study on the Development of Artisanal Fisheries in El Salvador), Nov. 2000- Feb. 2001

Remarks: 1) Figures refer to 1999 data of CENDEPESCA.

Figure 6-3: Diagram of distribution and volume of fish in La Libertad



Source: Field Study (The study on the Deelopment of Artisanal fisheries in el Salvador), Nov. 2000-Feb. 2001

Remarks: 1) Figures refer to 1999 data of CENDEPESCA..

Figure 6-4: Diagram of distribution and volume of fish in the departments of Usultán and La Unión

Table 6-7: Artisanal Fish Production and Its Utilization (1999)

(Unit: MT)

	Departments	Artisanal Production	Share of Total	Utilization		
				Local Consumption	Marketed Fresh	Artisanal Processing
ZONE – 1		1,211	29%	5%	65%	30%
	Ahuachapán	764		38	497	229
	Sonsonate	447		23	290	134
ZONE – 2	La Libertad			20%	65%	15%
		405	10%	81	263	61
ZONE – 3	La Paz			5%	70%	25%
		444	11%	22	311	111
ZONE – 4	Usulután			5%	75%	20%
		1,507	36%	75	1,131	301
	La Unión San Miguel			5%	65%	30%
		636	15%	32	413	191
	Total	4,203	100%	271	2,905	1,027
	Share			6%	69%	24%

Remarks: In absence of data and information on the utilization of the fish landings, type of utilization is estimated based on extensive interviews, field trips and observations.
Source: Artisanal production is based on the statistical data of CENDEPESCA.

5) Import and Export Pattern of Fish Products

The import and export volume of fisheries products of El Salvador is discussed in Section 5.1.2. The import of fish products by country of origin and import points is shown in Table 6-8, based on the provisional data for 2000 provided by the Quarantine Division of MAG. Costa Rica is the major exporting country to El Salvador within Central America. According to the customs data of El Amatillo, 87% of the import from Costa Rica is mainly canned fish. Imports from USA are 6% with the products, entering mainly through Anguiatu near the Guatemala border. The imports from the neighboring countries were 3% from Honduras and 2% from Nicaragua via El Amatillo, and 2% from Guatemala via La Hachadura.

Exports by country of destination are shown in Table 6-9. Anguita, Acajutla and San Salvador Airport are the main export points. Almost 95% of the exports which are mainly frozen shrimps is destined for USA,. About 50% of frozen shrimps are exported via Anguita, the main export point, on land through Guatemala to the Caribbean coast where it is shipped to Miami, and about 35% are exported by sea through Acajutla and 14% by air from San Salvador.

Table 6-8: Imports of Fish Products by Country of Origin and Import Points (2000)

(Unit: MT)

Import Points / Type of Products	Country of Origin							Total	Share
	Costa Rica	Honduras	Nicaragua	USA	Guatemala	Ecuador	Others		
El Amatillo								**3123.79**	93%
1) Canned sardine	2061.23							2061.23	
2) Canned tuna	398.72							398.72	
3) Frozen shark	477.50							477.50	
4) Frozen shrimp		23.23						23.23	
5) Fresh fish		14.28						14.28	
6) Marisco		45.04						45.04	
7) Snail		29.95						29.95	
8) Chacalin		2.07						2.07	
9) Fresh/fillet fish			71.77					71.77	
La Hachadura								**50.56**	1%
Fresh fish					49.57			49.57	
Shark fin					0.99			0.99	
Las Chinamas								**0.17**	0%
Fish Fillet					0.17			0.17	
Anguiatú								**189.82**	6%
1) Marisco				85.84				85.84	
2) Fish fillet				20.11				20.11	
3) Canned fish				18.25			1.09	19.34	
4) Calamar				17.24				17.24	
5) Imitation crab				17.85				17.85	
6) Processed marisco				8.98				8.98	
7) Processed fish				8.63				8.63	
8) Salmon				7.96				7.96	
9) Frozen shrimp				2.14				2.14	
10) Canned shrimp				1.11				1.11	
11) Fresh Fish				0.62				0.62	
Airport								**11.51**	0%
Fresh fish				0.22				0.22	
Marisco				1.18				1.18	
Anchovy				0.31				0.31	
Others							9.80	9.80	
Acajutla								**1.02**	0%
Frozen shrimp						1.02		1.02	
Total	**2,937.45**	**114.57**	**71.77**	**190.43**	**50.73**	**1.02**	**10.90**	**3,376.86**	**100%**
Share of total	**86.99%**	**3.39%**	**2.13%**	**5.64%**	**1.50%**	**0.03%**	**0.32%**	**100%**	

Remarks: Customs points on the Guatemala/El Salvador border are located in La Hachadura, Las Chinamas, and Anguiatú.

Source: Quarantine Division of Ministry of Agriculture and Livestock

Table 6-9: Exports of Fish Products by Destination and Export Points (2000)

(Unit: MT)

Export Points / Type of Products	Country of Destination						Total	Share
	USA	Guatemala	Honduras	Costa Rica	Mexico	Hong Kong		
La Hacharda							**53**	2.85%
1) Camaroncillo		5.94					5.94	
2) Frozen shark		32.04					32.04	
3) Shark fin		0.27			2.95	5.96	9.19	
4) Dry fish		5.91					5.91	
Las Chinamas							**2.27**	0.12%
Shark fin		2.27					2.27	
San Cristobal							**39.99**	
1) Frozen shrimp	11.48						11.48	
2) Camaroncillo		6.59					6.59	
3) Fresh fish		16.24					16.24	
4) Dry fish		5.68					5.68	
Anguitú							**743.52**	39.86%
1) Frozen shrimp	708.33						708.33	
2) Fresh fish	8.71						8.71	
3) Frozen fish	0.75						0.75	
4) Dry fish	25.73						25.73	
EL Amatillo							**14.72**	0.79%
1) Frozen shrimp	13.09						13.09	
2) Fresh fish			0.73				0.73	
3) Frozen fish				0.91			0.91	
Airport							**446.11**	23.91%
1) Frozen shrimp	218.31						218.31	
2) Fresh fish	207.18						207.18	
3) Frozen fish	3.56						3.56	
4) Chacalin	1.30						1.30	
5) Dry fish	13.16						13.16	
6) Shark fin	1.83				0.09	0.68	2.59	
Acajutla							**538.11**	28.85%
Frozen shrimp	538.11						538.11	
Cutuco							**27.66**	1.48%
Frozen shrimp	27.66						27.66	
Total	**1,779.20**	**74.95**	**0.73**	**0.91**	**3.04**	**6.64**	**1,865.46**	100%
Share of Total	95.38%	4.02%	0.04%	0.05%	0.16%	0.36%	100%	

Remarks: 1) A substantial quantity of nauplius of *Penaeus spp.* are exported through El Amatillo.
2) El Amatillo is on the Honduras-El Salvador border, and it also serves as the export and import for Nicaragua and Costa Rica.
3) Customs points on the Guatemala/El Salvador border are located in La Hachadura, Las Chinamas, and Anguiatú.

Source: Quarantine Division of Ministry of Agriculture and Livestock

6) Entry volume of fishery products that do not pass customs

As national demand increases, a great quantity of products is brought into the country through Guatemala, Honduras and Nicaragua, according to the traders. In view of this situation, this Study held interviews regarding products that do not go through customs. The study was carried out in fishery communities located in the frontier zones (with Nicaragua, Honduras and Guatemala) considering that these constitute the entry of most products. Five communities from the eastern region were selected (Tamarindo, El Jaguey, Playa Torola, Playa las Tunas, y La Unión) and three of the western region (Bola de Monte, Garita Palmera, y Barra de Santiago). Interviews were directed to 5 or 6 people in each community, adding to a total of 25 people in the eastern region (3 fishers, 12 product collectors and 10 traders) and 16 people in the western region (4 fishers, 9 collectors of products and 3 traders).

Tables 6-10 and 6-11 show the volume of commercialized fishery products within the Area of Study during the months of January and February 2000. The amount was broken down according to communities and at the same time percentages indicated according to country of origin. In the eastern region, of the total volume of distribution, 38% is domestic 61% from Nicaragua and 1% from Honduras. In the western region, 41% is domestic and 59% from Guatemala.

Table 6-10: Fishery commerce in the eastern region of El Salvador according to country of origin

Fishery Community	Quantity		Countries of Origin					%		
	Fish (pound)	Shellfish (number)	ES Fish	ES Shellfish	NIC Fish	NIC Shellfish	HON Fish	ES	NIC	HON
El	62,200		11,410		50,790			18	82	0
Tamarindo	42,700		16,790		25,910			39	61	0
El Jaguey	73,202		27,022		44,780		1,400	37	61	2
Playa Torola	35,740		21,040		14,700			59	41	
Las Tunas		*3,000		*1,800	1,200	*1,200		60	40	0
		#44,400		#18,480		#25,920		42	58	0
La Unión	7,150		5,124		980		1,046	71	14	15
Total	220,992	0	81,386		138,360	0	2,446	38 *43	61 *57	1

Note: ES: El Salvador, NIC: Nicaragua, HON: Honduras *: Number of curiles #Number of oysters

Table 6-11: Fishery commerce of the western region in El Salvador according to country of origin (from January to February 2002)

Fishery Community	Quantity	Country of origin		%	
	Fish and Shellfish (lb)	ES	GUA	ES	GUA
Bola de Monte	29,605	12,460	17,145	40	58
Garita Palmera	29,795	10,705	19,090	35	64
Barra de Santiago	23,610	10,380	13,230	44	56
Total	83,010	33,545	49,465	41	59

Note: ES: El Salvador, GUA: Guatemala

From Tables 6-10 and 6-11 and from the data from Table 6-7 “Artisanal Fish Production and Its Utilization” it is estimated that approximately 10% of the total domestic supply of fishery products, is brought into the country without going through customs. Given that total domestic supply according to CENDEPESCA’s statistics from the year 2000, is 10,826 MT, the introduced volume is 1,000 MT. However, according to estimations of the Study Team through the study of fishery product consumption, the total domestic supply is 46,085 MT, and the volume that does not pass customs is of 4.600 MT.

(2) Fish Traders and Market Network

Fish traders based on function or roles can be categorized as (1) assemblers, (2) assembler/wholesalers, (3) wholesalers in market, (4) retailers in market, (5) way-side sellers and retailers on foot, and (6) fish vendors on pickup trucks. Most of the assembler/wholesalers are boat owners who are also active as producers. This situation is noticeable in all landing sites. A noteworthy feature is the dominance of women fish traders who bring their fish to consumer markets to sell to retailers and wholesalers. The supply at production sites is small and not profitable for a major wholesaler. There are also women fish traders without fixed locations, and hence mobile as seen in production areas such as Ahuachapán and Sonsonate, these women assemble and transport fish to Sonsonate bus terminal or buy their fish at Sonsonate terminal, transport and re-sell at retail markets in Santa Ana and Ahuachapán.

(3) Mode of Purchase and Sales

The mode of purchase of fish at landing sites is based on a relationship established through provision of fishing inputs and credits by fish traders. An assembler derives her supplies directly from fishers or boat owners and pays directly in cash. The purchase price of the assemblers from fishers depends on the price quoted by fish traders in consumption areas. There are fish traders who obtain their supplies through informal contractual arrangements, and assuring the trader of a constant supply. This type of arrangement is by patron-client relationships arising out of informal credit transaction. Traders usually assist beach assemblers/boat owners in cash or fishing inputs such as fuel and ice.

The assembled fish is stored in insulated boxes with ice or in chest freezers and transported in small consignments to consuming markets. Fish traders have to invest at their own risk on vehicles, packing, ice, fish, and control of fishes’ freshness. The assemblers/wholesaler/boat owner to sell fish adopts different methods. Some have informal arrangement of sales with major wholesalers in San Salvador while others sell in the open market. Auction selling is not practiced.

(4) Role of Fishers Cooperatives in Marketing

The role of cooperatives in the fish trade is negligible and the marketing of fish is largely a

function of the private sector. However, the government expects that the cooperatives play a more active and a dynamic role both in the production and marketing of fish. Distribution of fish is minimal or non-existent among the fishers' cooperatives. The supply of fish volume by the cooperatives is relatively very low in comparison to the individual fishers to compete with wholesalers and retailers. The cooperatives do not have the business outlook or entrepreneurship skills in their operation and activity. There are no innovative skills for business operation among the fishers' cooperatives.

(5) Fish Products Handling

The handling of fish is very poor at all study locations due to the lack of icing, awareness of sanitary requirements and hygiene and requirements of quality fish for export. At some locations, the fish is exposed to direct sun light without ice or with little ice when displayed, thus reducing the quality of the product. It is evident that the traders and producers exercise very little care in the handling of fish.

Fish is packed, in aluminum containers (paila) or plastic boxes and transported in pick up trucks and buses. These aluminum containers come in different sizes; the small size can take about 50 lb and the large type can take about 100 lb. In case of large quantities, fish is transported in insulated trucks or refrigerated trucks that are available in limited number only to major wholesalers.

Block ice is used to preserve the fish. However, the generally accepted principle that the quantity of ice used should equal the quantity of fish preserved is not followed. All tend to use less ice. There is no shortage of ice at most of the landing sites except in Garita Palmira. Lack of awareness on handling practices and the high cost of ice are the major reasons for not using adequate ice. Cold storage of fish is limited to major wholesalers at terminal markets and some fishers cooperatives. Some assembler/ wholesaler/boat owners at landing sites do have cold storage in the form of chest freezers at home.

(6) Fish Products Transport

There is no special group of fish transporters in any of the landing sites. For the most part fish transport is undertaken under difficult conditions. In general, there are good road networks from production sites to consumption areas except in some fishing villages in Ahuachapán and Sonsonate departments. Assemblers use a common, shared or rented truck, their own pick up trucks, or public bus services to transport fish to intermediate or terminal markets. Exposure of fish to sun is very much evident in pickup trucks and vans during short distances. Insulated or refrigerated trucks is limited and entirely confined to the major wholesalers. It is also noticed that some traders load the fish directly into vehicles (not in boxes), and heaping layers of fish with some coating of crushed ice in between. There is a high possibility of the fish in the lower layers being bruised and damaged in transit.

6.1.4 Fish Products Price Analysis

It is difficult for wholesale and retailers to grasp price trends, since data on fish prices by species, month and season are not available. In addition to factors such as supply and demand, origin and quality, the relationship established through the provision of fishing inputs and informal credits by major fish traders also make a cumulative impact on the pricing of fish. The large wholesalers in San Salvador more or less decide the prices quoted by the assemblers/wholesalers at landing sites. Another related issue is the grading of fish for pricing that is not seen at different stages of marketing except for the most simplistic grading of fish the producer level. The fish is classified into three grades; first grade, second grade and third grade by species. The species in the first grade are shrimps, croakers, sea bass, snappers, in the second grade are groupers and sharks, and in the third grade are catfish, amberjacks, and conger eel.

The fish prices of producers, wholesalers and retailers observed during the study are shown in Table 6-12. The producer price at landing sites ranged from US $0.17 per pound for marine catfish to US $0.9 per pound for croakers. The wholesale prices of catfish and sea trout ranged from US $0.5 per pound to US $1.37-1.60 per pound, respectively. It was observed during the study that the price of some fish such as snappers, groupers depend on its size. For example, a large-sized whole fish (with head) such as a snapper is priced less than the smaller-sized fish that is served on a dinner plate.

Table 6-12: Fish Prices Observed During the Study

Unit: US $/lb

Local Name	Price per pound (US$/lb)				
	Landing Site	San Salvador		Sonsonate	Santa Ana
		WP	RP	WP	RP
Conger eel(fillet)	0.29 - 0.40	0.57 - 0.68	1.14 - 1.71		
Marine cat fish	0.17 - 0.29	0.57 - 0.68	0.91 - 1.14	0.57 - 0.68	0.80 - 0.91
Snapper	0.57	1.34 - 2.05	1.71 - 2.28		
Croakers	0.57 - 0.91	1.34 - 1.60	1.60 - 1.82	0.91 - 1.03	1.14 - 1.25
Spanish mackerel	0.34 - 0.46	0.57 - 0.80	0.91 - 1.14	0.80	0.91
Groupers	0.34 - 0.46	0.68 - 0.80			
Snapper(whole)	0.57 - 0.80	0.68 - 0.91	1.14		
Shrimp	5.13 - 6.27		9.12 - 10.26		8.55
Shark	0.46 - 0.57				
Shark (fillet)			1.14 - 1.71		
Jacks	0.23 - 0.57				
Snappers (fillet)	0.46 - 0.57		1.82		

Source: Interviews by the Study Team

The study included the collection of data on the cost-benefit relation of the fishers,

intermediaries and small scale-traders on three popular fish species namely croakers, Spanish mackerel and snapper. The main components of fish pricing from producer to consumer are summarized in Table 6-13. The producer price of sea trout at the landing site was US $0.68/lb, the wholesale price to the retailer was US $1.37/lb, and the retail price was US $1.71/lb.

Table 6-13: Main Component of Fish Pricing of Selected Fish

	US$/lb of Croaker	Share of retail price (%)	US$/lb of Colorado	Share of retail price (%)	US$/lb of Mackerel	Share of retail price (%)
1. Fishers						
Fish price paid to fishers	0.68		0.57		0.46	
Fishing cost (70 lb of fish)	0.25	15%	0.25	15%	0.25	22%
Profit margin	0.43	25%	0.32	19%	0.21	18%
2. Assembler/wholesaler						
Ice (US $2.28/100 lb)	0.01	1%	0.01	1%	0.01	1%
Transport (US $8.55/trip)	0.04	3%	0.04	3%	0.04	4%
Labour (US $1.71)	0.01	1%	0.01	1%	0.01	1%
Profit margin	0.62	36%	0.85	50%	0.28	25%
3. Retailer						
Handling cost	0.03	2%	0.03	2%	0.03	3%
Profit margin	0.31	18%	0.20	12%	0.31	27%
4. Consumer						
Retail price	1.71	100%	1.71	100%	1.14	100%

Remarks: 1) Average quantity of fish handled is 200 lb.
2) Handling cost includes ice and transport.
3) Estimated fishing cost per trip is about US$17.10 that includes fuel, bait, food and ice.
4) Estimated average fish catch per trip is about 70 lb.
Source: Field survey

The profit margin of fishers, wholesalers and retailers was US $0.44 (26%), US $0.62 (36%) and US $0.31 (18%) respectively of the retail price of US $1.71/lb of sea trout. Similarly, for boca colorado, the producer price was US $0.57/lb, the wholesale price to the retailer was US$ 1.48, and the retail price to consumers was US $1.71. The gross profit margins of fishers, wholesalers and retailers were US $0.32 (19%), US $0.85 (50%) and US $0.20 (12%) respectively of the retail price of US $1.71/lb.

It is rather difficult to grasp the reality of the price mechanism from this analysis because the price and margins vary by season, location and fish species cannot be verified here due to non-existent fish price data by season and time series. This analysis indicates that the producer's margin greatly depends on the fishing cost/expenditure, the type of fish caught and the catch per fishing trip. The operation cost per trip for fishers with gill nets is estimated to be between US $20-56, from which 60% accounts for the commission to sailors and 30% for fuel costs although depending on the fishery community and fishing method. An increase in fuel cost causes the profit margin to decrease, unless the fish catch per trip is increased. For example, gasoline prices from 1995 and 2001 increased 75.5%. However, the marketing

expenditure of wholesalers/assemblers was relatively negligible and profit margins relatively higher as wholesalers/assemblers, in terms of risk element in the marketing channel, take the greatest risk. An element of risk is also borne by the retailers to some extent, as they may have to sell below their cost because they are not equipped to store fish overnight.[2]

An attempt was made to analyze income earnings under different cases. In case number 1 (Table 6-14) a fishers' cooperative in Isla de Mendéz (ACOPIEM) marketed the fish catch of its members to San Salvador (La Tiendona). The net profit earned on 250 lb of fish was US $32.99 (14% of gross profit), after deducting marketing costs. In case number 2 (Table 6-15), a women fish marketing association (La Gaviotas) purchased from local individual fishers, earning US $17.67 (9% of the gross profit) on approximately 200 pounds of fish. In case 3 (Table 6-17) the retailer who purchased fish in La Herradura and sells directly in the municipal market in San Salvador earned a net profit of US $55.08 (67% of gross profit) on 70 lb of fish. In case 4, the retailer who bought from a wholesaler in La Tiendona earned a net profit of US $17.67 (18% of gross profit) on 80 lb of fish.

Table 6.14: Case 1: ACOPEIM in Isla de Mendéz
Markets fish purchased from cooperative fishers (250 lb/box)

(Unit: US $)

Type of fish	Q'ty (lb)	BP (US$/lb)	Value	SP (US$/lb)	Value	Marketing cost	Net Profit	Share of gross profit
First Grade	100	1.14	114.00	1.37	137.00			
Second Grade	100	0.57	57.00	0.80	80.00			
Third Grade	50	0.11	5.70	0.23	11.50			
	250		176.70		228.50	18.81	32.99	14%

Remarks: 1) BP = Buying price from fishers; SP = Selling Price to wholesalers in La Tiendona
2) Marketing cost includes US $1.71 of ice (75 lb) and US $17.10 for transport (cost of fuel using its own pickup truck)
3) The first grade includes shrimp, croakers, sea bass and snapper; the second grade includes grouper, morenas and sharks; and the third grade includes catfish, amberjacks and eels.

(Unit: US $)

	Total	Unit cost
Fish purchase	228.50	0.91
Fish sales	176.70	0.71
Marketing cost	18.81	0.08
Net profit	32.99	0.13

[2] Fish could be discarded although its price would decrease.

Table 6.15: Case 2: La Gaviota (Women Association) in Isla de Mendéz

Markets fish purchased from fishers twice a week (200 lb/box)

(Unit: US $)

Type of fish	Q'ty (lb)	BP (US$/lb)	Value	SP (US$/lb)	Value	Marketing cost	Net Profit	Share of gross profit
Boca Colorado	100	1.03	103.00	1.14	114.00			
Pargo	50	1.14	57.00	1.37	68.50			
Mojarra	50	0.34	17.00	0.46	23.00			
	200		177.00		205.50	10.83	**17.67**	9%

Remarks: 1) BP = Buying price from fishers; SP = Selling Price to wholesalers in La Tiendona

2) Marketing cost includes US $2.28 of ice (100 lb) and US $8.50 for transport (to and from) on a pickup truck

(Unit: US $)

	Total	Unit cost
Fish purchase	205.50	1.03
Fish sales	177.00	0.89
Marketing cost	10.83	0.05
Net profit	17.67	0.09

Table 6.16 Case 3: Retail Stall in San Marcos Municipal Market in San Salvador

Retailer lives in La Herradura and purchases and retails directly

(Unit: US $)

Type of fish	Q'ty (lb)	BP (US$/lb)	Value	SP (US$/lb)	Value	Marketing cost	Net Profit	Share of gross profit
Corvina	20	0.57	11.40	1.60	32.00			
Macrela	30	0.34	10.20	1.37	41.10			
Bagre	20	0.11	2.20	0.46	9.20			
	70		23.80		82.30	3.42	**55.08**	67%

Remarks: 1) BP = Buying price from fishers; RP = Retail price to customers

2) Marketing cost includes US $1.14 for ice, US $1.71 for transport (to and from) by bus, and US $0.57 for space rental to municipality.

(Unit: US $)

	Total	Unit cost
Fish purchase	82.30	0.41
Fish sales	23.80	0.12
Marketing cost	3.42	0.02
Net profit	55.08	0.28

Table 6.17 Case 4: Retail Stall in San Marcos Municipal Market in San Salvador
Retailer buys fish in La Tiendona

(Unit: US $)

Type of fish	Q'ty (lb))	BP (US$/lb)	Value	SP (US$/lb)	Value	Marketing cost	Net Pro	Share of gross profit
Corvina	30	1.71	51.30	1.82	54.60			
Macrela	40	0.57	22.80	0.91	36.40			
Bagre	10	0.57	5.70	0.80	8.00			
	80		79.80		99.00	1.71	**17.49**	18%

Remarks: 1) WP = Wholesale price from wholesaler in La Tiendona; RP = Retail price to customers
2) Marketing cost includes US $1.14 for transport, and US $0.57 for space rental to municipality.

(Unit: US $)

	Total	Unit cost
Fish Purchase	99.00	0.50
Fish sales	79.80	0.40
Marketing cost	1.71	0.01
Net profit	17.49	0.09

6.1.5 Fish Marketing Facilities

(1) Production Area

Most of the fish in the area are landed on beaches and simple concrete jetties except for two major fish landing sites at Acajutla and La Libertad (the Muelle). Below is a brief summary of these two main fish landing sites that will be discussed in more detail in chapter 8.

1)Acajutla Port

The port of Acajutla was constructed with the support of the IDB. It is presently managed and operated by CENDEPESCA with eight staff members and is the best-conditioned port in El Salvador. It caters to about 127 boats, 260 fishers, and amateur sports fishing boats. There are 5 wholesalers, 32 small fish traders, 3 hawkers, 6 transporters and about 40 workers for handling, cleaning and packing of fish. The cranes, ice making and other machines/facilities equipment are operated by ACOOPPAC. CENDPESCA collects user charges that are set by the Finance Department of the Ministry of Treasury. The rates for port usage of fishery vessel, applied in the old Fishery Law, increased (US $0.77/per day) but the rate of collection remained low. In view of this situation, the new Fishery Law promulgated in 2001, the tariff was reduced (US $0.26) to improve the rate of collection.

2) La Libertad Port

The old jetty serves approximately 100 fishing boats, and 140 fishers. About 70 wholesalers and retailers buy and sell fish on the jetty. The jetty is also used for boat docking, processing and drying of fish, which this has led to unhygienic conditions. Since it has not been decided who will administer the jetty, the activities taking place here cannot be controlled. Problems are frequent, and every year police intervention is necessary. In 1999, 54 fish traders formed an association called “La Sirena” with the guidance of CENDEPESCA. In addition an organization for men called “Los Delfines” was formed to implement good practices through this organization to voluntarily solve any problems and maintain the jetties. Later the organization was joined by “La Sirena” and the jetty administered and operated by both men and women.

(2) Consumption Area

1) Wholesale Market (La Tiendona)

La Tiendona is the only large wholesale market in San Salvador, which is owned and managed by the municipal government. It has space for the 4 to 5 types of wholesalers with refrigerated storage facilities. Wholesalers at La Tiendona are specialized in one or more activities (storage, transport and financing). They operate independently or in association with others, and owing to their storage capability, they can control prices according to supply and demand. They also channel certain products overseas and import fish from Guatemala, Honduras and Nicaragua.

There are about 40 tables for retailers within the building. Some of the major wholesalers may operate these retail tables. Some small retailers rely on the fish provided by the major wholesalers and depend on assemblers and/or wholesalers in the production areas.

Market operation begins in the early hours of 3:00 AM and finishes around 4:00 PM. Sanitary control in the Tiendona is carried out by the Municipality. Fishery products that are not fit for human consumption are separated by the municipal inspectors. Sanitary controls are carried out frequently since the inspectors go to the market daily in order to collect users rate from the wholesalers.

2) Retail Markets

There are more than 100 supermarkets in El Salvador, of which more than 80% retail fish. Fish are also retailed in the general municipal markets. In San Salvador, there are 24 municipal markets. Mercado Central is the principal retail market, and has about 40 fish retail counters, and a number of fish retailers on the road and passageways.

The other major retail markets are Cojutepeque, San Vicente, La Unión, Usultán Zacatecoluca, Santa Ana, Ahuachapán and San Miguel. In these markets there are

special places where fish is sold: the bus terminal of Sonsonate and the jetty in La Libertad, which has about 20 fish retail counters. These retailers rely on the fish provided by the major wholesalers and depend on collectors or wholesalers from the production areas. The bus company operates the Sonsonate bus terminal, which has a building with tables for 35 fish traders. This terminal functions as wholesale and retail outlets for about 40% of fish landings in Ahuachapán and Sonsonate departments. Fish is further distributed by wholesalers and retailers, small-scale traders, as far as Santa Ana, Ahuachapán, La Libertad, and San Salvador. This terminal is small, congested, unhygienic and not well managed.

The jetty in La Libertad is another site for fish sales, and is located in the abandoned site of the old port. There are about 50 to 60 fish traders or vendors on the jetty serving fish buyers who come from as far as San Salvador. It is congested and unhygienic as the jetty is also used for fish landing, fish processing (gutting, salting and drying), sales of other food items, souvenirs, etc.

(3) Ice Plants

There is no documented data on the number and capacity of ice plants. The number and capacity of ice plants shown in Table 6-18 was collected during this Study, and it may not be the actual number and rated capacity of ice plants in the country. There are 19 ice plants with a total capacity of 2,557 quintal (qq)[3] a day; of which 6 plants (308 qq/day) are managed and operated by the fishers cooperatives and the remaining 12 (2,249 qq/day) privately owned. Some 60% (1,455 qq/day) of the ice is produced in La Unión department with its five ice plants while Usulután has eight ice plants and an ice production capacity of 332 qq (13%).

The price of ice varies normally from US $2.28/qq to US $3.42/qq. However, this may go up to US $4.56/qq or come down to US $1.71/qq depending on the season and place. Fishers' cooperatives usually sell at an average price of US $2.28/qq to members and US $2.85/qq to non-members. Ice prices of private ice plants is about US $2.85/qq.

[3] 1 qq=100 pounds

Table 6-18 Number and Capacity of Ice Plants

Name of Ice Plants		Capacity (qq/day)	Location	Dept.
Fishers Cooperatives				
1ACOPELI	Cooperative	138	La Libertad	La Libertad
2ACOOPP	Cooperative	40	La Libertad	La Libertad
Subtotal		**178**		
3FECOOPAZ	Cooperative	32	La Herradura	La Paz
4Private plant (1)	Private	300	Costa de Sol	La Paz
Subtotal		**332**		
5Complejo Pesquero	Private	720	La Unión	La Unión
6INDUMAR	Private	75	La Unión	La Unión
7ESCAMA	Private	120	Tamarindo	La Unión
8VERALMAR	Private	480	La Unión	La Unión
9El Jaquey	Private	60	El Jaquey	La Unión
Subtotal		**1455**		
10Private plants (2)	Private	**260**	Acajutla	Sonsonate
Subtotal				
11ACOOPSEMPEP	Cooperative	40	Puerto el Triunfo	Usulután
12ACOOPEIN	Cooperative	18	Puerto el Triunfo	Usulután
13ACOOPARADA	Cooperative	40	Puerto Parada	Usulután
14Jacobo Campos	Private	20	San Miguel	Usulután
15Soc. Munguia	Private	40	Usulután	Usulután
16Soc. Munguia	Private	34	Puerto el Triunfo	Usulután
17Ant. Leiva	Private	40	Usulután	Usulután
18Atarraya	Private	100	Puerto el Triunfo	Usulután
Subtotal		**332**		
Total		**2557**		

Remarks: 1) An ice plant of fishers cooperative (capacity 70 qq/day) in Torola is not operation.
2) In Barra de Santiago (Ahuachapán), there is only private ice storage (capacity 70 qq)
3) One quintal (qq) is equal to about 100 lb.
Source: Field Survey

The assemblers and wholesalers indicated during the study, there is a stable supply of ice in production areas. However, production sites located in Bola de Monte, Garita Palmera, in Ahuachapán department do not have access to ice except Barra de Santiago, which has a private ice storage facility. In places where there is no ice, the fish assemblers and wholesalers make their own ice in home freezers.

6.2 Fish Product Processing

There are two types of processing: industrial processing and artisanal processing. The most of industrial fisheries production, which is mainly shrimps, is processed for export except for the portion of the catch of the shrimp trawlers that is consumed fresh or processed into dry-salted fish for local consumption. There are 19 processors as shown in Table 6-19, of which only four fully comply with HACCP standards and another five comply partially. A small quantity of fresh or frozen fish such as dolphin fish, snappers and groupers are also processed as fillets

for export.

There is no data on artisanal fish processing in terms of quantity, type of fish used, seasonality and area. Based on interview surveys and observations, it is estimated 24% of the fish landed in the artisanal fishery sector is processed. Assemblers and wholesalers undertake processing as a seasonal activity commencing from around November till April in preparation of the holy week (Semana Santa). During this period, fish is also imported from the neighboring countries. Fishes to be processed could be divided into two kinds: one is fishes that are mainly for processing such as catfish, croakers, mackerel; and the other is fishes such that are no longer fresh, low-grade and small, and these are statistically categorized under “other fishes”. Salting and drying is the most common method of processing. The process of preparing the fish is by removing offal, entrails and other inedible portions, applying salt, and drying, which takes about 3 to 5 days. The processors engage in these activities at home, on the jetty, or at the market premises etc.

Table 6-19: List of Fish Processing Plants in El Salvador

	Name of Firms	Location	Type of Products
1	San Marino, S.A. de C.V.***	Acajutla	Frozen shrimp and camaroncillo
2	EXPORCA, S.A. de C.V.***	San Marcos	Frozen shrimp and camaroncillo
3	VERALMAR, S.A. de C.V.***	La Unión	Frozen shrimp and camaroncillo
4	Mission Shrimp***	Acajutla	Frozen cultivated shrimp
5	PESQUIN, S.A. de C.V.**	Acajutla	Frozen shrimp and camaroncillo
6	ACOOPUERTO de R.L.**	El Triunfo	Frozen shrimp and camaroncillo
7	Eliseo Antonio Soriano Alvarado**	El Jagüey	Frozen shrimp and camaroncillo
8	PRESCOMAR, S.A. de C.V.**	El Jagüey	Frozen shrimp and camaroncillo
9	INNOVACIÓN, S.A. de C.V.**	Punta. Gorda	Frozen shrimp and camaroncillo
10	PROCEMI, S.A. de C.V.*	Acajutla	Frozen shrimp and camaroncillo
11	PROMARISAL, S.A. de C.V.*	Acajutla	Frozen shrimp and camaroncillo
12	Conchagua, S.A. de C.V.*	Acajutla	Frozen shrimp and camaroncillo
13	Marina del Pacífico, S.A. de C.V.*	La Libertad	Frozen shrimp and camaroncillo
14	PRESCOMAR, S.A. de C.V.*	San Salvador	Frozen shrimp and camaroncillo
15	FECOOPAZ de R.L.*	La Herradura	Fresh fish products
16	EMPROMAR, S.A. de C.V.*	Cutuco	Frozen langostino and shrimp
17	CORSAIN*	Punta. Gorda	Frozen fish products
18	SALVAFISH, S.A. de C.V.*	Punta. Gorda	Frozen shrimp and camaroncillo
19	MULTIPESCA, S.A. de C.V.*	Carr. Playitas	Frozen shrimp and camaroncillo
20	FORMOSA, S.A. de C.V	San Salvador	Fresh dried-salted, shark sub-products
21	SUPER MARINO, S.A de C.V	San Salvador	Fresh shrimp cocktails and mariscos

Remarks: *** comply 100% with HACCP standards, ** comply 60% with HACCP standards, * Do not comply with HACCP standards
Source: CENDEPESCA

(2) Impact of shrimp harvest decrease

The decrease of the shrimp harvest has affected numerous people working in the fishing sector. Based on the interviews of members of the shrimp fishing boats and processors, it was verified that 27 to 28 individuals among crewmembers and land operators work also in the

operation of shrimp fishing boats (Table 6-20). The wages of the crewmembers (approx. 5) total US $1.647 (per trip), and land operators (21 or 22) total US $3.429 (monthly wages). If a shrimp fishing boat suspends operations, at least 27 to 28 individuals are affected based on these data.[4]

Table 6- 20: Categories and number of people required in shrimp processing (one boat)

Land Operators		Crewmembers	
Position	Requirement	Position	Requirement
Wharf Manager	1	Captain	1
Warehouse personnel	1	Navy mechanic	1
Boat guard	1	Sailors	3
Load operators	4	Cabin boy	1 or 2
Mechanic	1	Total	6 or 7
Electrician	1		
Carpenter	1		
Processors	9		
Plant Manager	1		
Driver	1		
Total	21	Total requirement	27 or 28

Observation: Data of fish processing plants have been used as reference.

(3) Non-industrial processing of fish products

Non-industrial processing consists of two main products: dried-salted products and filets. In fact, most small-scale fishers sell the fresh fish to intermediaries. While there are some fisher families that prepare dried-salted fish from low commercial fish, between November and March dried-salted fish and filets are prepared by the intermediaries or retailers in order to cover demand for this product during the Holy Week. Other main reasons why small-scale fishers do not consider processing a main economic activity are cultural patterns (preference for immediate cash) and lack of knowledge (processing techniques and marketing channels sales).

(4) Processed fish products (raw materials, processes, products and market)

Table 6-21 shows the main processing methods utilized in the country, depending on the raw material. Frozen shrimp is the main product of industrial processing under the HACCP system.

[4] Cabin boys are included among crewmembers but their salary is extremely low. Land operators only work when there is product (an average of two times per month).

Table 6-21: Raw materials, processes, finished product and market of processed products

Raw materials	Processes	Final products and market
Shrimp Small shrimp	- Head removal - washing - selection - packing – freezing– conservation - Head removal - washing - selection - packing - freezing – conservation - Plant delivery – thermal treatment (salt and colorants) - Plant or intermediary delivery - washing – refrigeration and storage (with ice)	- Frozen shrimp (headless) - export - Frozen small shrimp (headless) - export - Dried-salted small shrimp – domestic market - Fresh small shrimp– Domestic market and Guatemala
Snapper (*Luljanas spp)* Grouper (*Serranidae)* Croaker *(Scianidae)* American *(Pomadasys spp)* Mahi-mahi *(Coryphaena hippurus)* Merlin White tuna	- Without visceras– packing (ice and cooling material) - Without visceras– packing (ice) - Preparation of filets – packing (ice and cooling material) - Without visceras – head and fin removal – preparation of filets	- Fresh – export - Fresh – domestic market - Filets – domestic market / export (small scale) - Fresh (conservation in cold environment) - export
Shark Charruda	- Preparation of filets – refrigeration and storage (ice) - Preparation of filets – drying and salting - Preparation of ground shark meat	- Fresh filet - domestic market - Dried-salted - export - Meat balls - domestic market - Skin, bones and fins - export
Eel	- Preparation of filets - Drying - salting (sun-dried)	- Eel filet - domestic market - Dried-salted - domestic market，export
Catfish *(Bagre spp)* Lisas- (*Mugil spp)* Mojarra *(Ariidae)* American *(Pomadasys spp)* Croaker *(Scianidae)* and mackerel *(Scomberomorus sierra)*	- Preparation of filets– refrigeration and conservation (ice) - Gutting– drying and salting (sun dried)	- Fresh - domestic market - Fresh - domestic market

Production list per processing method

1) Small shrimp and fish drying and salting (non industrial)

   Torola Beach is a fishing community that is famous for the drying and salting of low-value fish. Table 6-22 shows the breakdown of the production cost of the drying and salting of low-value fish (small fish and shrimp) in Torola Beach.

Table 6-22: Dried-salted production cost (small shrimp and fish) in Torola Beach

(Unit: US $)

Description	Small shrimp		Small fish		Combination	
	1991	2001	1991	2001	1991	2001
Cost of raw materials (fresh)/ "paila"*		114.00		22.50		135.50
Yield (from fresh to dried-salted)		68%		65%		
Cost of raw materials (cooked)/ paila*		114.00		22.50		136.50
Transportation (by sea)		0.43		0.14		0.57
Transportation (by land)		1.30		0.42		1.72
Cost of selection		5.14		1.72		6.86
Cost of washing		1.72		0.57		2.29
Cost of water		0.86		0.28		1.14
Cost of waste disposal		0.86		0.28		1.14
Fuel (firewood)		1.30		0.42		1.72
Cost of salt		1.00		3.00		4.00
Labor		2.29				2.29
Patrolling				3.43		3.43
Cost of colorants		1.72				1.72
Total		130.62		32.76		163.38
Weigh of finished product		76.00		73.00		
US$/lb.	#0.94	1.72	#0.22	0.45		

Observations:

1. One "paila" contains approx. 225 lb of small fish and shrimp. Nearly 50% is small shrimp and the remaining 50% is small fish.
2. # It was not possible to obtain the details of production costs in 1991. Only the average production cost per pound was obtained (Source: PRADEPESCA)

2) Frozen shrimp production cost (harvest and processing costs)

Table 6-23 shows the operating costs of shrimp fishing boats. Estimates are based on interviews with personnel of a private shrimp processing company. Table 6-24 shows the necessary costs to produce frozen shrimp. Table 6-23 shows that the operating costs of 1998 were higher than those of 2001. However, when comparing the volume of the shrimp harvest of 1998 and 2001, it is observed that the harvest was better in 1998 and therefore incomes higher.

Table 6-23: Shrimp and small shrimp harvest cost

(Unit: US$)

Costs	1991	1998	2001
Fuel (3,000 gallons)	2,100.00	1,566.00	2,828.00
Food	150.00	149.08	171.40
Lubricants	40.00	201.09	100.00
Health and cleaning		189.75	102.00
Fishing gear	200.00	1,873.52	100.00
Maintenance	150.00	230.54	
Repair works	200.00	183.49	588.00
Use of wharf	140.00	160.55	176.00
Labor	1,000.00	2,174.00	1,178.00
Ice	500.00		700.00
Others	200.00		1,114.00
Total	4,680.00	6,728.02	7,057.40

Shrimp catch (lb.)

Raw material	1991	1998	2001
Shrimp	1,400.00	1,200.00	261.00
Small shrimp	1,160.00	2,800.00	4,412.00
Total	2,560.00	4,000.00	4,673.00
Cost of the catch (US$/lb.)	1.83	1.68	1.51

Table 6-24: Frozen shrimp processing cost

(Unit: US$/lb.)

Costs	1995	1998	2001
Electric power	0.015	0.020	0.030
Labor	0.110	0.110	0.120
Facilities (ice / packing / freezing)	0.025	0.030	0.050
Administrative expenses	0.060	0.070	0.090
Others	0.030	0.030	0.030
Total (US$/lb.)	0.240	0.260	0.320

Observation: this production cost list does not include bank interest or the gross profit of processors.

3) Fish processing cost

①Fresh fish processing

Fresh fish processing consists of: washing – selection – without visceras – conservation in cold environment, in that order. In order to estimate processing costs, a food processor working with fresh fish was interviewed. The production cost increased from US $0.15/lb in 1995 to US $0.225/lb in 2001, according to Table 6-25. The cost of packing for export was not included in this table since not all processed products were exported. The cost of raw materials was not included either, since it varied depending on the type of product.

Table 6-25: Production cost of fresh fish processing

(Unit: US$/lb)

Costs	1995	2001
Labor	0.090	0.100
Ice	0.045	0.100
Depreciation	0.005	0.005
Administration and operation	0.010	0.020
Total	0.150	0.225

②Filet preparation

The domestic market for filets is smaller than the market for fresh fish. However the international market has great potential. Table 6-26 shows the breakdown of the cost of preparing filets. This table does not include the cost of packing required for export since not all processed products are exported. The cost of raw materials was not included either, since it varies depending on the type of product.

Table 6-26: Production Cost of filet preparation

(Unit: US $/lb.)

Costs	1995	2001
Labor	0.180	0.200
Ice	0.050	0.100
Depreciation	0.005	0.005
Administration and operation	0.010	0.020
Total	0.245	0.325

③Dried-salted

Dried-salted fish is divided into two categories. The first consists of non-industrial processing using snappers (*Lutjanas spp*), lisas (*Mugil spp.)* mackerels (*Scomberomorus sierra),* etc. Costs include labor and salt. The second category consists of drying and salting of shark filets of which the main market is Mexico. Table 6-27 shows the breakdown of the production costs of shark drying and salting.

Table 6-27: Production Cost of dried-salted shark

(Unit: US $/lb.)

Costs	1995	2001
Labor	0.160	0.180
Salt	0.090	0.090
Waste disposal	0.040	0.005
Administration and operation	0.040	0.050
Total	0.330	0.370

④Fish burger processing

In El Salvador there are fast food restaurants that sell fish burgers using shark meat. Since accurate cost data was unavailable, the production cost was estimated based on

raw materials (US $1.37), sale price (US $3.75), and other estimated costs as shown in Table 6-28. The value obtained was US $0.57/lb. The fish meat used in these restaurants contains 99% ground shark and 1% reinforcement.

Table 6-28: Production cost of fish hamburgers

Description	US$/lb.
Labor	0.200
Ingredients costs	0.010
Equipment costs	0.100
Administrative costs	0.080
Yield ratio	0.010
Other (energy, packaging, marketing)	0.170
Earnings	1.380
Tax	0.430
Total	2.380

(6) Fish products and processed products sanitary control system. The fish products and processed products sanitary control is the task of the General Director's Office for Vegetal and Animal Sanitation (DGSVA)[5] of MAG and CENDEPESCA. These two offices are also in charge of HACCP advisory and approval. However, at present it cannot be said that there is an adequate system to control and provide advice on fishing sanitation issues due to lack of human resources and budget. The tasks are carried out based on the legal guidelines entitled "Good Manufacturing Practices Standards". These guidelines made up the sanitation control handbook that applies throughout the process, from the harvest to the sale of fish products in the retail market.

[5] The General Director's Office for Vegetal and Animal Sanitation（DGSVA） has a unit specialized in fishing called "Fishing Resources Health and Certification Unit".

Chapter 7 Aquaculture

7.1 Current status of aquaculture

The main aquatic organism object of the aquaculture in El Salvador is shrimp. Shrimp is the only product cultivated at commercial scale and fish appear in the statistics because they are cultivated together at some shrimp farms. Besides, *Anadara spp.* (also refer to as ark shells) has been recently introduced on an experimental basis as resources have decreased in the last years. A description of the current status of the sector is provided here below.

7.1.1 Shrimp Culture

(1) Current Status

Shrimp, particularly white shrimp (*Penaeus vannamei*) is an important export good for El Salvador. Exports in 1998 reached 3,914 MT equivalent to US $28.5 million.[1] According to CENDEPESCA statistics, the aquaculture produced 13% of the total production equivalent to 217 MT before Hurricane Mitch in 1998.

Table 7-1: Evolution of the *Penaeid* Shrimp Production by Sector

Unit: MT

	1994	1995	1996	1997	1998	1999	2000
Small-scale fishing		402	329	459	230	174	176
Industrial fishing	2,039	1,780	1,303	951	1,603	1,054	410
Aquaculture	515	244	205	207	85	97	191
	2,554	2,435	1,836	1,627	1,917	1,325	777

Source: CENDEPESCA

The main shrimp production areas in El Salvador are Jiquilisco Bay (Province of Usulután), Fonseca Gulf and La Unión Gulf (La Unión). The Salvadoran aquaculture started in the Jiquilisco Bay at the beginning of the 80's when salt producers cultivated the organisms in the rainy season when salt could not be produced. At that time, it was possible to cultivate approximately 550 kg/ha. Later in 1985, three farms were set up in the same zone and thus aquaculture was intensified.

Most farms in these zones are managed by cooperatives or individual. There is one farm

[1] White shrimp for exports not only comes from industrial and small-scale fishing and aquaculture but also from neighbor countries. For this reason, fishing production and exports statistics do not agree.

in Los Cóbanos managed by a private company. According to data provided by PRADEPESCA, in 1995 there were 23 saltpans and shrimp farms (1,464 ha) in the province of Usulután and 87 (596 ha) in La Unión. However, since CENDEPESCA statistics for the year 2000 only include information of 614 hectares (50 correspond to La Unión while the rest correspond to the Jiquilisco Bay), farm shrimp production in the statistics is below the real figures. (For more details, refer to Table 6-1 of the Annex of each chapter from "Annex".)

Statistically, shrimp farming is divided in two big categories: extensive and semi-intensive farming. In 1999, there were 30 farms in the Jiquilisco Bay, and 28 of them were classified as extensive.

The profile of shrimp farms registered in the Jiquilisco Bay in 1999 is described in Table 7-2 (refer to the Annex for more details).

Table 7-2: Operation Status of Shrimp Farms in the Jiquilisco Bay

Farming Methods	Farms	Production (kg)				Area (ha)	Production per Ha (kg/ha)	
		Shrimp	Sambo	Other fish	Total fish		Shrimp	Fish
Extensive	28	157,393	26,397	1,294	27,691	488.2	354.6	61.0
Semi-intensive	2	56,700	3,900	47	3,947	58	950.0	69.1
Total	30	214,093	30,297	1,341	31,638	546.2	546.2	57.9

Source: CENDEPESCA

A brief description of the farming activities by private company, cooperatives and individuals is presented below.

1) Shrimp Farming by Private Companies

In Los Cóbanos, there is a Taiwanese affiliate company specialized in *Penaeus monodon* farming in Taiwan. Originally, the company hoped to cultivate *P. monodon* that was later replaced by white shrimp due to difficulties to import shrimp for breeding. The activities carried out are based on the technology developed in Taiwan and the company is in close contact with the technical cooperation project of that country that is implemented in the Los Cóbanos Center (former El Zope Aquaculture Center) of CENDEPESCA.

Ponds are equipped with water mills according to their surface size, and feed shrimp with fodder of U.S. origin. The water is taken by an electric pump. Cultivating density is of about 75 shrimp/m^2 (post larvae phase) and the farming period varies from 3.5 to 4 months. The survival rate in the last cycle (December 2000) was 75% at the moment of harvest (size: 16 to 20g). Disease control techniques have been developed with the

cooperation of an experimental farm of Hawaii that seems to be the most technologically developed farm in El Salvador. Basically, products are fully intended for exports although when the production is low they are also sent to the local market.

2) Shrimp Farming by Cooperatives and Individuals

Shrimp farms managed by cooperatives and individuals are concentrated in Usulután and La Unión. Most of the farms in the Jiquilisco Bay were originally saltpans. When the political conflict ended, the Central Government with the support of the European Union implemented "Usulután II" a reinsertion program for former guerrillas in the Province of Usulután in which the process of converting saltpans into shrimp farms in the mouth of the Lempa River was included. The program covered twelve fishing cooperatives. Multiple projects to promote shrimp farming are under execution in the Jiquilisco Bay either as a social reinsertion process of former guerrillas or as a control measure against illegal deforestation of mangroves (executed by environmental NGOs).

The present study includes the study of the three NGOs providing support to aquaculture activities in the Jiquilisco Bay: ①CODEPA, ②Association Mangle, and ③Salvadoran Farming Development Association (ASDEC). The activities conducted by each of them are described here below.

① Development Committee of Puerto Parada (CODEPA)

As shown in Figure 7-1, the Development Committee of Puerto Parada (CODEPA) is an entity integrated by four fishing cooperatives and the Community Development Association (ADESCO) of Puerto Parada, carrying out activities aimed at environmental conservation and community development since 1997, with the support of FONAES and FIAES. Resource planning and management for their activities is the responsibility of DEICO, a private consulting company with headquarters in San Salvador.

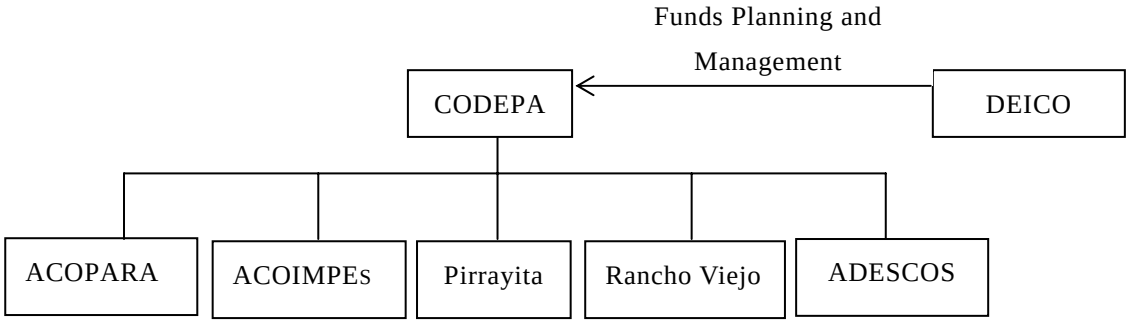


Figure 7-1: CODEPA Member Organizations

Since 1998 the aquaculture project of ark shell (*Anadara spp.*,) oysters and shrimp was created as an integral part of this project. Concerning the shrimp culture, CODEPA is conducting a joint research with a biology department of university to provide technical assistance and demonstrations to ACOPARADA in a self-owned experimental farm of 500 m^2 located in Puerto Parada. ACOPARADA has carried out three shrimp farming cycles since 1999. The first two cycles failed due to having started to manage the farm without sufficient technological transfer.

② Mangrove (Mangle) Association

This NGO belongs to the Low Lempa Coordinator and Jiquilisco Bay and engages in the conservation of mangrove resources and improvement of the living conditions of the Jiquilisco Bay and Lempa River Mouth communities. It started shrimp farming as a measure to restore the saltpans affected by Hurricane Mitch in 1998. The initial phase works involved the rehabilitation of saltpans and ponds in seven fishing cooperatives. At present, the organization provides support to the repair of ponds, technical training, etc. for 18 cooperatives.

③ ASDEC (Salvadoran Farming Development Association)

This is an NGO which promotes the semi-intensive farming of the "31 de Diciembre Cooperative" located west of the Jiquilisco Bay, with funds provided by the European Community. This cooperative was set up to promote the social reinsertion of former guerrillas; it has a 28.5 ha. farm operated under the semi-intensive method. ASDEC support involves technical assistance for farm construction and management. At present, the cooperative has made profit through semi-intensive farming and considered as one of the best farms in Usulután.[2]

(2) Shrimp Farming Income and Expenditure Model.

The 2000 income and expenditure statement of the 31 de Diciembre Cooperative is herein analyzed as a case study. Out of more than 30 shrimp farms located in the Jiquilisco Bay coast, only the farms of this cooperative and another have adopted the semi-intensive farming method while the rest of them works under extensive farming. The cooperative sold 20,970 lb (9,520 kg) in one cycle in 2000, making a total of US $100,795. The operating costs including sales and administrative cost amounted to a total of US $57,087, with a positive balance of US $43,708.

[2] Unfortunately, this cooperative was damaged by the earthquakes of January 13, 2001, specifically in the gates and walls of the farm, and the operation was suspended for repair when the Study Team visited the site.

Table 7-3: Income and Expense Statement of "31 de Diciembre" Cooperative
2000 First Cycle

Gross Sales	$	100,795
Operating Costs	$	38,093
[Breakdown]		
Fuel and lubricants	$	2,282
Labor	$	6,892
Materials and parts	$	3,111
Purchase of larvae	$	10,543
Fodder	$	15,265
Farming costs	$	3,855
Gross Profit	$	58,847
Sale Expenses	$	15,139
Operating Profit	$	43,708

Source: ASDEC

When the planning was made, profits for a total of US $205,200 were estimated for two cycles per year (one cycle: US $102,600). Since a positive balance of US $100,795 was obtained, it can be said that the goal was almost met. Since the area of the cooperative farm is 28.5 ha., it translates into the profit of US $1,533/ha.

Current situation of the production of larvae

The production of white shrimp post-larvae is mainly carry out by the private sector, though imports from Nicaragua. From the post-larvae production of the year 2000, of 60 million units, 10 million were produced in the Los Cóbanos Center of CENDEPESCA in Los Cóbanos. While the other 50 millions were produced at a private center in La Libertad Department.

(3) Problems of Shrimp Farming

This section summarizes the main problems faced by shrimp farmers in El Salvador.

1) Limited Capacity of Local Larvae Supply

Presently, there is one state-owned larvae production center and two of the private sector in the country but their capacity is not sufficient to supply the total national demand. This situation forces some farms to reduce the operation rate of their facilities. Additionally, the deficiency of the larvae production system is one of the causes of uncontrolled natural larvae catch.

2) Exploitation of Natural Larvae

Due to the short supply of seeds, shrimp farms also use natural larvae. Some farms give priority to natural larvae since the artificial ones have higher incidence of contamination with "Taura" and other diseases. At present, the shrimp larvae catch is not regulated and the volume of the catch is unknown. Nevertheless, by taking

into account the farming potential in El Salvador, it is likely that the catch will reach high volumes in the future and the impact on the shrimp resources availability in the coastline is of great concern.

3) Lack of Development of Shrimp Farming Technology in Salt-pans
A shrimp farming technology that fit to the Salvadoran environmental conditions has not been developed and still many farmers lack the right feed or water change knowledge. This is one of the causes of extremely low productivity. In order to promote shrimp farming with systematic feed it is essential to establish an adequate technology with the implementation of a feed rate in accordance with the food composition, shrimp growth, adequate water change methods, etc.

4) Lack of Efficiency of Training Institutions
The Cóbanos Center (the former El Zope Aquaculture Center) offers training programs on shrimp farming technology. However, it cannot be said that it operates efficiently since only part of the information has reached the fishing cooperatives. NGOs are also working on technology transfer to individual cooperatives although there are differences in the technological level and the impact is not significant.

5) Lack of Quarantine Control System
The shrimp farming industry in El Salvador, as well as the rest of neighbor countries, is affected by the spread of diseases such as the white spot syndrome, "Taura", etc. With the exception of the private company that are controlling the situation through the services of foreign research institutions, most farms do not have access to information on the cause, solution, treatment, etc. of diseases. CENDEPESCA does not have this type of information either and therefore the country has not developed a quarantine system in this sector.

In addition to the above-mentioned problems, it has been reported that semi-intensive farms operating with electric pumps, water mills, etc. cannot perform stable activities due to frequent power outage.

7.1.2 *Anadara spp.* Farming

(1) Current Status of the *Anadara spp.* Farming

Mollusks, including *Anadara spp.,* are collected in the Salvadoran coasts. Although, this activity is mainly carried out by women and children, some fishermen participate as well. As it was previously mentioned, many refugees emigrated to the Jiquilisco Bay during the political conflict engaging in inshore fishing and other economic activities. It is reported

that many decided to collect mollusks because they do not require special equipment or techniques. This overexploitation had an adverse effect on the *Anadara spp.* reserve and it has been reported that this population was drastically reduced. Overexploitation has also been detected in La Unión. Due to the reduction of the catch in the area, some fishermen go to Honduras to collect this resource.

There are three *Anadara spp.* species in El Salvador: "Casco de burro" (*A. grandis*), curil (*A. tuberculosa*) and curililla *(A. similis*). Due to a recent increase in fishing effort, the *Anadara spp.* resources have been overexploited thus provoking a substantial reduction of such resources, particularly of "Casco de Burro" (*A. grandis*) that has high commercial value. The other two species are also exploited and its volume seems to have been reduced in the last years.

In view of this situation, efforts have been made recently to culture *Anadara spp.* in different places in the country. The projects associated with farming of *Anadara spp.* as of the date the present study are described below.

1) Community Aquaculture Projects in Isla de Méndez and Barra de Santiago.

The experimental farming of *Anadara spp.* is presently executed within the frame of the CENDEPESCA projects in Isla de Méndez (Jiqulisco Bay, Usulután) and Barra de Santiago (El Zapote Gulf, Ahuachapán) by JICA experts assigned to this institution. The objectives of the project are to:

- Reduce the workload of children engaged in the extraction of mollusks and generate educational opportunities;
- Reduce the workload of women; and
- Analyze *Anadara spp.* adaptability for farming in each body of water based on its growth stage.

These projects are funded by Japanese small grant aid project executed by cooperatives involving women only. In Isla de Méndez, the cooperative started the experimental farming of *Anadara spp.* in May 2000. At the beginning, the Cooperative obtained a body of water of 1,088 m^2 (32 x 34m) where concrete pillars were built with intervals of 3 m. In the second phase, it obtained additional 3,500 m^2 although at present only the surface obtained in the initial phase is in use. This land is belonged to the Ministry of Natural Resources and is used freely by the Cooperative.

During the first experimental farming, "curiles" (*A. tuberculosa*) of approximately 35 mm long were purchased from the local fishermen and "curilillas" (*A. similis*) from the local mollusk extractors at a price of US $1.7-2.3/60 mollusks, and were placed in

1,088 m^2 of water. During the experiment, the facility was watched day and night by the members and their relatives were hired as guards. Since July in the same year, the Cooperative is covering the expenses of hiring night guardians with OXFAN America funds (support period: 1 year). In this experiment, a monthly monitoring was carried out with the assistance of CENDEPESCA-El Triunfo office but it failed in the fourth month due to theft. Data on the *Anadara spp.* growth gathered in that opportunity are presented below.

Table 7-4: *Anadara spp.* Growth Data in Isla de Méndez

	May	June	July	August	September
Length (mm)	35.9	37.0	38.1	39.3	40.9
Weight	13.4	15.4	17.4	20.0	21.6

Source: CENDEPESCA

During the present study, the Cooperative was in the second cycle of the experimental farming (started in November 2000) using 18,000 larvae of the same size as in the first cycle.

On the other hand, Las Barreñitas Cooperative in Barra de Santiago started the first experimental farming of *Anadara spp.* in December 2000. However, since the works started before setting up a specific plan and an operative and maintenance system for the experiment, the project did not bring any positive result. It should be brought to the attention that other efforts to cultivate *Anadara spp.* had been made in Barra de Santiago within the Green Project framework with U.S. support. This project also failed because most of *Anadara spp.* mollusks were stolen.

2) Development Committee of Puerto Parada (CODEPA)

Besides shrimp, CODEPA also carries out the demonstrative farming of *Anadara spp.* in Ranchoviejo and Pirrayita, in bodies of water of 2 ha. each. These bodies of water are used with MAG's authorization on a temporary basis.

The experiment involves the local inhabitants who extract mollusk larvae, from 2 to 3 cm., to release them in the demonstrative farm. Casco de burro (*A. grandis*) is cultivated for resources protection purposes while the other two species are intended for commerce. Nevertheless, when the Study Team conducted the visit to the Pirrayita farming demonstration site, the project had not reached a marketing volume of cultivated mollusks since they have been affected by theft, hurricanes and earthquakes.

3) REDES (Salvadoran Foundation for Reconstruction and Development)
REDES is an NGO engaged in fishing and mangrove conservation activities. At the beginning, the organization was exclusively engaged in mangrove conservation activities in the Jiquilisco Bay and later incorporated the farming of *Anadara spp.* into the project since it was detected that these resources were endangered.

The organization started the experiment of mangrove preservation and reproduction of this species in Puerto Avalos, in 1995. Based on the results, the site of the project was transferred to the bottom of Ensenada El Astillero Bay, SE of Isla San Sebastián in July 2000. In this site, 2,772 m^2 of water was enclosed with nets to cultivate "Casco de burro" (*A. grandis*). The larvae are purchased from the local inhabitants at ¢1/larvae. By January 2001, more than 2,000 mollusks had been purchased. The project is financed by FIAES.

REDES plans to define in the future a protected area for "Casco de burro" (*A. grandis*) in order to ensure the sustainability of the fishing activities. This NGO also offers training programs on the resources of the Jiquilisco Bay and on the sustainable exploitation of these resources. An eco-tourism project is also underway aimed at other communities of the urban areas.

Since February 2001, REDES plans to start the following one-year activities with Italian funds (¢ 500,000).

- Mangrove reforestation (*Rhyzophara marple*): 50 ha.
- Ecotourism (extend the area to include all of the Jiquilisco Bay)
- Reproduction of three species of *Anadara spp.* and a crab sp. *Ucides occidentalis*[3]

4) Farming of "Casco de burro" (*A. grandis*) by Independent Farmer
The farming of "Casco de burro" (*A. grandis*) was started in Barra de Santiago by an individual in 1999 who has already marketed the product. This farm shows two different points as compared to other *Anadara spp.* farms.

The first point is that it works exclusively with "Casco de burro" species (*A. grandis*) being fed until they reach more than 6cm for higher commercial value. According to the experience of this farmer, 4.5 cm mollusks took more than one year to reach more than 6 cm, which is the marketable size of this farm.

[3] Ucides occidentalis: Crab of high commercial value that has been overexploited in the Jiquilisco Bay, putting resources in risk of exhaustion.

The other point is the methodology adopted for the farming. While the bottom farming system is similar to other farms, the density of this farm is very high. Approximately 15,000 mollusks are kept in this farm in a 7 x 7m. pond. The pond is protected against theft by constructing a hat over the farm.

(2) *Anadara spp.* Income and Expenditure Model

Only one farm generating profit from the sale of products has been identified in this Study. This is a farm managed by an individual farmer in Barra de Santiago. It has a peculiar management system consisting in long-term feeding of "Casco de burro" (*A. grandis*) that reserves are increasingly reducing, until they reach the sufficient size with high commercial value.

Therefore, this study comprises a comparative analysis of the profits based on the example of Gaviota Cooperative in Isla de Méndez that cultivates "curiles" (*A. tuberculosa*) and curilillas (*A. similis*), relatively abundant resources, until they reach a marketable size in a relatively short period. The analysis basically involved a comparison of the profit taking into account the operating costs and market prices based on past real cases. However, since the *Anadara spp.* farming in El Salvador is in the experimental phase, as it was mentioned above, and the necessary conditions to make a projection are still unknown, part of the *A. granosa* farming data from Thailand, Malaysia, etc., were applied.

The larvae purchasing and guard hiring costs are included in the farming cost of *Anadara spp*. Those cost and biological data were obtained from the disbursements presently made by Gaviota Cooperative. For the first experimental farming cycle, this cooperative used *Anadara spp.* of 3.5 cm with a growth rate of 1.25 mm/month.[4] Based on this data, if the purchased larvae size is 4 cm, they will need 4 months to reach the marketable size (4.5 cm). While the previous experiments have had a very low recovery rate due to several reasons, such as theft or earthquakes, a 70% recovery has been herein defined considering that the larvae used are relatively big and the farming period is short.

[4] According to the National Nansei Fishing Research Institute, *Scapharca broughtonii* with an external shell size of 4 mm and a weight of 17g has grown to 48mm and 28g, respectively, in a two-month feeding period (Bull. Nansei Reg. Fish. Res. Lab. No. 16, 1984). Upon comparison of the results of this experiment, it can be said that the growth of the *Scapharca broughtonii* of Isla de Méndez is too slow.

Table 7-5: Projection of the Income and Expenses Statement of the *Anadara spp.* Farming by Gaviota Cooperative

	Size of Larvaes					
	3.5 cm			4 cm		
Expenses						
Number of mollusk larvae	20,000	45,000	78,000	20,000	45,000	78,000
Purchase unit price (60 larvae)	1.7	1.7	1.7	2.3	2.3	2.3
Larvae purchase expenses	567	1,275	2,210	762	1,715	2,972
Cultivation period (months)	8	8	8	4	4	4
Guardian hiring (4 months) *1	1,316	1,316	1,316	658	658	658
Total expenses (1)	1,883	2,591	3,526	1,420	2,373	3,630
Income						
Mollusks recovery	70%	70%	70%	70%	70%	70%
Sale unit price (60 mollusks)	4.6	4.6	4.6	4.6	4.6	4.6
Total sales (2)	1,073	2,415	4,186	1,073	2,415	4,186
Balance						
(2)-(1)	-809	-176	660	-347	42	556
In case guarding hiring is not included	507	1,140	1,976	311	700	1,214

Note: *1: Guardian expenses are real values of Gaviota Cooperative (US $82.3/month by day and US $ 96/month at night)

The previous calculation does not include the depreciation of the facilities or *Anadara spp.* harvest. If Gaviota Cooperative would continue working with 20,000 mollusks the resulting balance would be negative, while if it increases the total to 45,000 mollusks, the balance would be even.

On the other hand, this table includes guard-hiring expenses. Gaviota Cooperative is currently hiring the services of its members to keep the day watch, and their relatives to keep the night watch. It has contributed to the generation of employment and to the real increase of member income. If guardian expenses are excluded, with 20,000 mollusks the Cooperative would be generating profits for a total of US $311.

In comparison, the farms of *A. granosa* use 4-10mm larvae fed for about one year and then sold. The production per unit of surface is 18 MT/ha. If the weight of a mollusk at the moment of the sale would be 25g, the farming density would be calculated to be 72 mollusks/m^2. Since the farming density adopted by this Gaviota Cooperative is 16.5 mollusks/m^2, it is estimated that four times more *Anadara spp.* can be cultivated in the same extension. Applying this assumption, the potential number of *Anadara spp.* is

estimated to be 78,000 and the profit is estimated to be US $556 (or US $1,214 if cost guards are excluded).

(3) The problems faced by the sector for *Anadara spp.* farming are detailed here below:

1) Theft

Interviews with cooperative members and individual farmer engaged in *Anadara spp.* farming reveal that theft is the most significant problem in this activity. Gaviota Cooperative has been forced to hire day and night guardians, incurring in monthly expenses for a total of US $178. Other farms managed by cooperatives or NGOs do not hire permanent guardians and therefore do not include this entry in their budget. However, it does not mean that they are free from theft but that it is due to lack of an operating and maintenance system of the facilities and a passive approach to this problem.

Based on the experimental projects presently underway and on previous projects, it is concluded that surveillance is an essential factor for *Anadara spp.* farming in El Salvador. Nevertheless, since the wholesale price of the product is low in order to cover guarding hiring expenses and generate sufficient profits, a minimum of 30,000 mollusks have to be cultivated by cycle.

2) Uncontrolled Exploitation of the Resources: Larva Extraction

All *Anadara spp.* farms cultivate natural larvae of 3cm. However, the catch as well as the marketing of “Casco de burro” (*A. grandis*) with shells of less than 10 cm, and “curiles (*A. tuberculosa*) and curilillas (*A. similis*) of less than 4.55 cm are forbidden. Therefore, the farming method used is illegal. Furthermore, the purchase of these larvae could accelerate even more the reduction of the reserve of *Anadara spp.* that is already at risk.

In view of the fact that there is high probability in the near future of mass production technology of natural larvae through JICA cooperation, it is important to start efforts in order to develop a farming technology accordingly. However, it is necessary to keep *Anadara spp.* farming at experimental level without exerting more pressure over the available reserve.

3) Lack of Farming Planning

As it was previously mentioned, the catch of *Anadara spp.* has undergone a drastic reduction in the last years even though there are no official statistics to prove it. In view of this situation, fishermen of La Unión are forced to go to neighbor countries.

From another point of view, it means that there is a specific demand for *Anadara spp.* in El Salvador.

Research on *Anadara spp.* catch and breeding started in March 2001, within the frame of JICA's technical cooperation. Once the mass production technology of natural larvae is developed, the overexploitation of seed shell problem would be solved and the way to mass farming of *Anadara spp.* would be open.

Due to the low wholesale price of *Anadara spp.*, big volumes have to be marketed in order that this activity provides farmer with sufficient income. While the sales goal differs depending on the level of target income, if the minimum income is assumed in the line of relative poverty in this region, in 1998, the annual income per family should be at least US $2,469. As indicated in paragraph 6.1.2(2), *Anadara spp.* farming equires to spend US $1.7 to 2.3 per 60 mollusks for the purchase of larvae, not including guardian expenses. If the sale price of *Anadara spp.* is defined in US $4.6/60 mollusks, 40 to 50% of the profit has to be assigned to the cost of larva purchase. Considering only the cost of larvae as initial aquaculture investment (assuming 40% of the unit sale price) in order to obtain the minimum income proposed it is necessary that a family sells at least 54,400 mollusks per year. On the other hand, if the target income is defined as the agricultural, or industrial, commercial or services' minimum wages, the volume of sales should be of about 13,000 and 25,000 mollusks, respectively.

Table 7-6: Volume of Sales Necessary to Obtain the Target Income (*Anadara spp.*)

	Reference Wages		
	Line of Relative Poverty	Agricultural Minimum Wages	Industrial, Commercial and Services Minimum Wages
Sale price of *Anadara spp.* (per 60 mollusks)	$ 4.6	$ 4.6	$ 4.6
Larvae purchase (per 60 mollusks)	$1.7	$ 1.7	$1.7
Target annual income *1	$2,469	$ 592	$ 1,152
Number of mollusks to obtain the proposed annual minimum income	54,000	13,000	25,000

Note:
*1: For the calculation the monthly wages of the line of relative poverty of the region of US$ 250, defined by the Ministry of Economy, the minimum day's wages defined by the Superior Labor Council for farming (US $2.5) and for the commerce, industry and services sector (US $4.8), for 1998, were applied. In the case of day's wages, a total of 20 working days per month was applied.

The annual catch of *Anadara spp.*, "curiles" (*A. tuberculosa*) and "curililas" (*A. similis*) in the Jiquilisco Bay went up to about 38 million units in 1999 and 27 million units in 2000 (for more details refer to Tables 7-4 and 7-5 from the Annex of each chapter of "Annex").

Table 7-7: Catch Volume of *Anadara spp.* in the Jiquilisco Bay

Unit: 1,000 mollusks

	1999												Total
	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sept.	Oct.	Nov.	Dec.	
"Curil" (*A. tuberculosa*)	552	2,200	3,219	1,667	885	1,226	1,503	823	1,654	688	3,973	3,060	22,451
"Curililla" (*A.similis*)	271	857	2,055	991	1,732	716	1,604	691	656	1,533	2,791	1,782	15,679
Total	823	3,057	5,274	2,658	2,617	1,942	3,107	1514	2,310	2,221	6,764	4,842	38,130

Source: CENDEPESCA

Unit: 1,000 mollusks

	2000												Total
	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sept.	Oct.	Nov.	Dec.	
"Curil" (*A. tuberculosa*)	735	764	2,614	1,875	956	713	572	2,641	1,600	1,286	1,501	1,522	16,781
"Curililla" (*A.similis*)	455	506	571	918	545	518	392	1,686	1,311	1,037	1,229	1,291	10,458
Total	1190	1270	3,185	2,793	1,501	1,231	964	4,327	2,911	2,323	2,730	2,813	27,239

Source: CENDEPESCA

The catch of 38 million mollusks corresponds to 700 to 3,000 families, considering the different proposed income. At present, it has been reported that there are from 3,000 to 5,000 shellfish extractors in Jiquilisco Bay exclusively engaged in mollusk catch activities.

Furthermore, assuming the weight of *Anadara spp.* of commercial size (25g for 4.55 cm), 38 million mollusks translate into 950 MT. If the production per surface unit of this species is 18 MT/ha., the demand of 950 MT is covered by 53 ha. farms.

At present, in the *Anadara spp.* farming it is difficult to plan the target production, number of beneficiaries, target income of the latter, etc. Besides, there is no information on the market and the demand and supply of these mollusks in El Salvador for 2001 is unknown. Therefore, parallel to the development of the farming technology, it is necessary to verify the volume of the demand and supply, the impact of mass farming of *Anadara spp.* on the remaining fishermen, and at the same time, to formulate a farming plan.

4) Verification of suitable areas for *Anadara spp.* farming

The experimental farming presently underway in Isla de Méndez, has reported a growth rate of 1.25-mm/ month with regard to *Anadara spp.* While it was not possible to obtain other data than these on the growth of *Anadara spp.* in El Salvador, the rate is comparatively slower than that of the same species in Japan.

The selection of suitable areas for *Anadara spp.* farming is subject to a series of criteria and it is necessary to verify if the above-mentioned growth rate is normal for this type of species or whether it is due to an external factor (including environmental) adversely affecting it, as well as other farming factors.

5) Use of farming areas and competition with other fishermen
In order to cultivate *Anadara spp.*, it is necessary to use a specific extension of water on an exclusive basis, which is presently used by other fishermen. Once the mass production technology of natural larvae is developed and the private sector starts participating more actively in the farming of this species, it is likely that there will be competition among the other fishermen in terms of the fishing areas.

The "National Basic Fisheries Strategy", establishes the abolition of the right of free catch and introduces the bidding system for farming in state-owned grounds, defining the areas suitable for farming. In order to define the farming areas of *Anadara spp.*, concessions should be granted systematically after defining the ideal production volume based on the supply and demand, current status of fishing in target areas as well as the presence of other social activities, *Anadara spp.* market, etc.

7.1.3 Other Problems of Farming Coastal Resources

So far, we have discussed the current status of shrimp and *Anadara spp.* farming in El Salvador. Additionally, the following limitations were identified concerning aquaculture development and management of coastal resources.

(1) Possibility of overexploitation of other Coastal Resources rather than *Anadara spp.*
With the increase in consumption of fishing products in the last years, even coastal resources that had not been previously subject to catch have started to acquire commercial value in the market. However, the real situation is unknown due to lack of information on the evolution of the volume of reserve and catch, etc. Some NGOs have reported that the catch of bivalves (*Mytella guyanensis*) and crabs (*Punche Ucides occidentalis*) in the Jiquilisco Bay has drastically increased in the last years.

Over exploitation would put coastal resources at risk of depletion, the same as with *Anadara spp.*; therefore, parallel to regulations enforcement it is necessary to develop larvae production technology and farming of species with higher commercial value as well as to promote the development of the private sector industry.

(2) Low Technological Level of CENDEPESCA

At the present, Los Cóbanos Center is the only marine aquaculture facility of CENDEPESCA. Although in this Center shrimp seeds are produced, it does not count with the needed facilities for the cultivation of marine fish or laboratories of fish diseases.

CENDEPESCA has very few personnel specialized on farming; consequently, Los Cóbanos Center is practically run by Taiwanese experts. While there is an oceanographic research center in Usulután, the most prosperous province of the country regarding shrimp farming, this center also lacks specialized personnel on shrimp farming and does not have sufficient capacity to transfer technology to other nearby farms.

(3) Lack of Awareness on Resources Conservation

The biggest problem affecting the successful management of the resources is the level of awareness amongst coastline inhabitants on the need to protect the resources. One of the motivations to start the farming of *Anadara spp.* was to recover mollusk reserves. It is believed that the inclusion of an awareness program aimed at the local inhabitants on the protection of coastal resources within the *Anadara spp.* farming promotion plan will contribute to establish a sustainable aquaculture system.

7.2 CENDEPESCA Farming Development Guidelines

7.2.1 Higher Plans and Legislation Concerning Aquaculture

(1) National Aquaculture Development Plan in El Salvador

The National Aquaculture Development Plan in El Salvador drafted in 1997 establishes 2001 as the horizon year including the following aquaculture programs (only those associated with sea-farming are mentioned).

1) Technical Aquaculture Strengthening Project.
   - Mollusk farming technology promotion with particular emphasis on bivalves and oysters.
   - *Penaeid* shrimp larvae production technology improvement
   - National species reproduction technology promotion
   - Drafting of sea-farming development master plan
   - Development of interdisciplinary databank

2) Aquaculture System Program

- Establishment of the national registration system of aqua cultivators
- Revision of aquaculture-related legislation
- Optimization of aquaculture health standards
- Optimization of aquaculture and fishing products quality control standards
- Optimization of aquatic development methodology
- Evaluation and adjustment of standards
- Zoning of bodies of water for shrimp farming

3) Sea-farming Development Sub-project

- Transfer of technology on shrimp larvae breeding and control
- Zoning of bodies of water to extract shrimp larvae
- Shrimp farm operation and maintenance training
- Shrimp larvae production increase
- Training to producers on new techniques
- Transfer of technology on cultivated shrimp quality assurance
- Setup of a demonstrative shrimp farm in Jiquilisco Bay

4) Aquaculture Strengthening Support Project

- Improvement of aquaculture feed production
- Establishment of farm water quality analysis service
- Consolidation of Aquaculture Organizations from different levels
- Processing facilities capacity improvement
- Establishment of a financing system according to aquaculture
- Training to producers on a modern administrative and management methodology
- Promotion of production, processing and distribution organizations

(2) Pertinent Legislation

1) Mangrove Development Regulations

Regarding the Regulations for the establishment of saltpans and aquaculture exploitation they are described in Chapter 10 and11. These regulations establish that the development of sea farming is allowed for up to a maximum of 600 ha. Furthermore, it establishes that a farm should have a surface of 20 to 50 ha. The authorities very seldom consider development projects from the environmental preservation point of view.

2) Regulations for the Implementation of the General Fishing Law concerning *Anadara spp.*

Article 12-e of the Regulations for the Implementation of the General Fishing Law prohibits the catch and marketing of "Casco de burro" (*A. grandis*) with shells of less than 10cm. long, "curiles" (*A. tuberculosa*) and curilillas (*A. similis*) of less than 4.55cm.

7.2.2 CENDEPESCA Farming Licensing System

Whoever wishes to engage in fishing or aquaculture activities in El Salvador requires to be registered in CENDEPESCA and obtain the corresponding permit (National Fishing and Aquaculture Policy 4-4). As of January 2001, the permit could be obtained only at CENDEPESCA's headquarters in San Salvador. In the future, however, it will be possible to obtain the permit through local offices CENDEPESCA as a result of decentralization effort. The procedures to obtain permits are the following:

① Apply the location of the farm to the General Natural Resources Division of MAG
② The location map and the activity profile of the farm will be submitted to the Ministry of Environment and it will be verified that there are no environmental problems. In case the farm is located in a mangrove area, the environmental impact study will be required.
③ The required documents will be submitted to CENDEPESCA in order to obtain the aquaculture permit.

With regard to fisheries cooperatives, the president has to submit the permit application. In this event, a cooperative certificate issued by the Farming Association Department has to be submitted as well. The permit will be valid for five years and may extended for equal periods of time. The cost of the permit is shown in Table 7-8.

Table 7-8: Farming Permit Price

Cultivated Species	Permit Cost (Colones)
Sea shrimp PL	100.00/ha/ year
Freshwater shrimp PL	75.00/ha/ year
Farm larvae	25.00/ha/ year
Floating cage larvae	25.00/ha/ year
Ornamental fish farming	25.00/ha/ year
Shrimp larvae farming	100.00/ha/ year

Source: Agricultural Association Department, MAG

7.2.3 Los Cóbanos Center (Former El Zope Aquaculture Center)

Los Cóbanos Center located in El Zope, Province of Sonsonate, is an aquaculture sea and freshwater research institution of CENDEPESCA. This center was built and operated with the assistance of the government of Taiwan. The facilities include covered larvae production tanks (20 concrete tanks of 20 MT, adult shrimp farming tanks) and open ponds (three of 4,000 m^2 and two of 200 m^2). The main shrimp species that are cultivated are *Penaeus vannamei* and *Macrobrachium rosenbergii*. In the year 2000, the larvae production reached a total of 15 million and 1.5 million organisms per year, respectively.

One or two Taiwanese experts work in the facilities on a permanent basis in the production of larvae and providing training to approximately 100 people of the private sector on shrimp farming techniques.

The larvae produced in this center are sold at low price.

Table 7-9: Sale prices of Los Cóbanos Center products

Species	Cost (¢)
Sea shrimp PL	250.00/ thousand units
Freshwater shrimp PL	250.00/ thousand units
Fish larvae	200.00/ thousand units
Floating cage larvae	300.00/ thousand units
"Guapote tigre" (edible freshwater fish) larvae	300.00/ thousand units

Source: Los Cóbanos Center

7.2.4 Assistance Guidelines from Other Donors

The only foreign organization other than JICA that is presently assisting CENDEPESCA on marine aquaculture-related activities is Taiwan. While the social reinsertion project for the former guerrillas implemented by the EU in Usulután also includes shrimp farming as one of its components, there is no relationship with CENDEPESCA.

Taiwan assistance started in 1993 involving the following:

(1) Objectives

① Introduction of species suitable for El Salvador and pertinent farming technology.
② Promotion of freshwater shrimp farming (*Macrobrachium rosenbergii*) and operating cost reduction
③ Promotion of shrimp farming in salt-pans

(2) Programs

① Production of freshwater and sea water shrimp larvae
② Sea shrimp farming
③ Shrimp farming in salt-pans
④ Tilapia and freshwater shrimp farming
⑤ Aquaculture training

(3) Results

① Setup of shrimp larvae production farms
② Technical assistance to the private sector on freshwater and sea water shrimp farming
③ Freshwater shrimp farming cost reduction
④ Protection of two sea shrimp species (*Penaeus vannamei, P. stylirostris*) according to the production season in the same salt-pans (farm)
⑤ Introduction of the artificial maturing methodology of adult sea shrimp)
⑥ Implementation of combined freshwater shrimp and tilapia farming

The volume of sea and fresh water shrimp (adult and larvae) produced with the technical cooperation of Taiwan is presented here below.

Table 7-10: Shrimp Larvae Production with the Technical Cooperation of Taiwan

Unit: 1,000units

	1995	1996	1997	1998	1999
P. vannamei	2,030	360	12,470	2,130	14,600
M. rosenbergii	790	630	690	1,090	1,400

Source: Technical Agricultural Mission of China in El Salvador

7.3 Study of Development Potential according to Farming Species

7.3.1 Shrimp Farming Potential Areas

PRADEPESCA study conducted in 1995 has identified the following three areas as shrimp farming potentials in El Salvador.

Table 7-11: Exploited Surface (1995) and Saltpans and Shrimp Farming Potential

Potential development		
Potential Areas	Potential Areas	Existing Salt-pans and shrimp farms
Jiquilisco Bay	2,000 ha	1,464 ha
Fonseca Ban and La Unión Bay	from 1,000 to 2,000 ha	596 ha
Garita Palmera Bay	60 ha	24 ha

Source: El Salvador organization and development of the cultivation of sea shrimp

The area with greatest potential is the Jiquilisco Bay with an exploitable surface of 2,000 ha. out of which 1,500 ha. are already in use as salt-pans and shrimp farms. The second area in terms of potential is La Unión with an extension of great variations ranging between 1,000 and 2,000 ha.

The above-mentioned exploitable areas include mangroves which exploitation would not contribute to a sustainable fishing development from the point of view of coastal resources management. The Central Government practically prohibits the exploitation of mangroves.

Based on the above, it can be concluded that the areas subject to development in the present study should be limited to the existing saltpans and shrimp farms. Specifically, they comprise 1,464 ha in the Jiquilisco Bay and 596 ha. in La Unión, according to 1995 data.

The Natural and Renewable Resources Division of MAG, responsible for the control of saltpans, has the following information on saltpans and shrimp farms by province as of the year 2000.

Table 7-12: Saltpans and Shrimp Farms area by Province – 2000

	Salt-pans		Shrimp Farming		Total Area (ha)
	Number of Concessions	Area (ha)	Number of Concessions	Area (ha)	
La Unión	94	738	7	228	966
Usulután	65	1,702	7	137	1,839
La Paz	5	49	5	51	100
Sonsonate	2	9			9
San Vicente	1	2			2
Ahuachapán			1	NA	NA
Total	167	2,500	20	416	2,916

Note: Two partial data are missing. Saltpan's data correspond only to temporary saltpan convertible into shrimp farms.
Source: Natural and Renewable Resources

In the year 2000, the surface of saltpans and shrimp farms has been more extensive in the Province of Usulután (Jiquilisco Bay) with 1,839 ha. followed by La Unión with 966 ha.

There is a little increase as compared to the data of 1995 since the development of mangroves is practically forbidden. Based on the above, it can be assumed that the potential area will not show significant variations in the next years.

7.3.2 Potential Area for *Anadara spp.* Farming

The *Anadara spp.* reserve in the mangrove of the Salvadoran coastline from Barra de Santiago in the west to La Unión in the east has been observed in the present study even though the fishing activities had been reduced due to resources reduction. It is possible that *Anadara spp.* requires a different habitat depending on the species, and it is then necessary to establish the selection indicators or criteria of the suitable areas through the experimental farming projects in the next years. If the recovery of the *Anadara spp.* reserve was defined as farming target, the potential areas would comprise all the mangroves is the coast of El Salvador.

7.3.3 Other Mollusks Species

In El Salvador, there are other mollusk species than *Anadara spp.* with high farming potential. One of them is an oyster: *Crassostrea rhiziphorus* that dwells in mangroves and *Ostrea irridescens* that dwells in the coast. At the present, basic technology for the cultivation of oysters (native and exotic) through the Technical Cooperation Project of JICA is taking place. Once the extraction techniques for the natural larvae are established, the native specie could have a high potential for cultivation. Regarding the exotic specie of rapid growth, its potential will be evaluated based on the price of the larvae and the results of the experimental cultivation.

On the other hand, *Mytella guyanensis* and *Pteria spp*, both bivalves, can also be included. Particularly, the Study Team verified the reserve of large amounts of small *Pteria spp* close to the existing shrimp farm gates. Furthermore, larvae of this species were also detected in the collectors installed by an NGO in Jiquilisco Bay, showing the high potential of natural larvae catch. While FUSADES report (1988) sustains that *Pteria spp* is not included in the Salvadoran staple diet, the Study Team has verified that the fishermen of La Unión are processing the mollusks with a salt bath and drying.

7.3.4 Other Fish Species

At present, the fish exported by El Salvador are: groupers (*Epinephelus spp, Cephaluphalus sp*), sea bass (*Centropomus spp*), Dolphin fish (*Coryphaena hippurus*), red snapper (*Lutjanas spp*), croaker (*Scianidae*) and sharks, among others. Of the above,

the species that can be used for farming from the technical point of view are: groupers (*Epinephelus spp, Cephaluphalus sp*), sea bass (*Centropomus spp*), red snapper (*Lutjanas spp*) and croaker (*Scianidae*). Of these, the species that have farming potential from the technical point of view are: groupers, sea basses, red snappers and croaker.

These sea fish require large amounts of fodder. To this effect, small fish caught as morallas of shrimp trawlers could be used although they are consumed by small-scale fishermen. When considering that the demand for fish is unlikely to increase in the future, it may be of little relevance to consider sea fish farming under the present conditions.

On the other hand, crabs such as “punches” (*Ucides occidentalis*) or “jaibas” (*Callinectes sp*), also have farming potential in the future, even though it is necessary to solve the larvae supply problem.

Chapter 8 Fishing Infrastructure Improvement

8.1 Present Status of the Fishing Communities and Ports of the Country

8.1.1 Fishing Communities and Ports Classification

Notwithstanding the planning of construction or repair of fishing port development facilities is generally based on local navigation conditions, vessel use methods, port arrival and departure conditions, etc., the local topography plays a determining role in the planning. Therefore, in the present study, the areas with similar topographic conditions will be put in groups and the plans will be formulated based on the characteristics of each group. The fishing communities and ports[1] that are distributed throughout the country are divided into the following main four groups:

A) Coastal fishing communities
B) Bay area fishing communities and ports
C) Urban fishing ports
D) Island fishing communities

8.1.2 Coastal Fishing Communities

The coastline of these communities is straight and shows little variation. This section, starting from the fishers' huts built on the continent, is first made up by a stretch which goes in the direction of the coastline at the same height as the continent followed by another stretch which gradually slopes towards the sea, and finally, by the stretch which gradually slopes downward the open sea. During the low tide, the beach dries up by about 100 m and waves break in the shallows.

Vessels are usually placed on the natural beach since these communities have neither wharves nor anchoring areas. Hamlets are scattered around the palm tree woods and houses are simple constructions made out of palm tree trunks and leaves. Communities and roads are connected to one or two access roads of about 10 m wide, with only several hundreds of meters. In the stripe between the main road and the beach there is no public or community land since all of it is occupied by fishers' huts. The communities that belong to this "coastal fishing community", which are among the priority locations covered in this study, are the following:

[1] For the effects of this document, fishing port refers to a community provided with wharfs, etc. as opposed to a community which does not have any facilities.

1) Garita Palmera
2) Barra de Santiago
3) Los Cóbanos
4) San Marcelino
5) San Antonio Los Blancos

8.1.3 Bay Area Fishing Communities and Ports

These are communities and ports that are located at the coastal lowland alongside the bay. Some communities have port facilities and others do not. In order to set sail from the bay to the Pacific Ocean, vessels should go through the shallows or a stretch called sandbank where there is a marked displacement of the coastline. This stretch loses its depth during the low tide and is very difficult to navigate due to the effects of the predominant waves. Vessels usually go through this sandbank during the high tide when the water depth increases.

In non-port fishing communities, the beach depth is drastically reduced when the water level rises during the high tide. Some fishers have built steps that are used as the water level increases.

Port communities with wharves or other port facilities have a high wharf crest that allows docking the vessels even during low tide since the water is deep enough. Although there are still water areas, fishers do not dock their vessels in the sea but they leave them on the beach close to their communities (at the bottom of the bay), the water depth during the high tide, and channels. There is only one exception: at El Tamarindo where the beach is narrow, the vessels are anchored in a still water area using anchor and ties. This method enables to increase efficiency while sailing or disembarking. The communities and ports that are comprised in this category are the following:

1) Isla de Méndez
2) Puerto El Triunfo
3) Puerto Parada
4) El Tamarindo

8.1.4 Urban Fishing Ports

The ports comprised in this category are Puerto Acajutla and Puerto de la Libertad.

The first one is deemed as the most modern fishing port of the country even though

wharves, breakwater dikes, dock areas, and other facilities experience size problems. Upon arrival or departure from the port, vessels are normally lifted from or lowered into the sea by crane, on a one-by-one basis. Consequently, several vessels cannot sail from the port simultaneously. Standby vessels are stored inland. The processing plant, port offices, parking lot, warehouses and refrigeration areas are located behind the tail of the wharves. The breakwater dike is an E-W orientation and is built with pebble and concrete blocks. It is a big breakwater dike covered with stones of more than 3 MT. Mooring areas are affected by sinking. At present, there are no sedimentation problems since the area was dredged in 2000; nevertheless, it is estimated that a new dredging should be made within six or seven years. The height from the seal level to the wharf crest during the low tide is above 3 m and this complicates handling and unloading operations.

Concerning Puerto de La Libertad, the center is found in the lowest area of the bay where the wharf is located. The transition corridor between the wharf and the jetty is used as the fishing port. The concrete slabs of the wharf are paved with asphalt. The wharf measures approximately 196 m long and 8 m wide. The width increases in one of the ends (towards the sea) up to 16 m by a stretch of 30 m approximately. Vessels are lifted or lowered by fixed crane.

8.1.5 Island Fishing Communities

The fishing communities of Isla Zacatillo, Isla Conchaguita, Isla Meanguera, the three islands of the Province of La Unión, designated as priority areas in the present Study, are located close to the coastline with very pronounced slopes. There is almost no flat ground here but only beaches with gradual slopes in the bottom of the bay. The communities are scattered around these sloped lands alongside the coastline. They have no roads suitable for vehicles. Beaches are sloped and their surface does not vary between high and low tide. Vessels cannot rest on the beach during the low tide since the area is very shallow and therefore unloading of goods can only be made by bringing the vessel close to the beach during the high tide with the help of several people. In order to boost the modernization process of this community, it is necessary to build simple mooring facilities not only for fishing purposes but also for improving the social infrastructure of the islands.

The communities of Isla Zacatillo are located in a small open bay towards the east side. There is a sandy beach within the bay and precipices at both east and west sides. There is a natural breakwater dike in this area that prevents sediment slides by the action of the waves. These communities lack of special port facilities. There is a ramp in the middle of the beach and there are also concrete steps in other places facing the

sea. There are no facilities either which allow the mooring of vessels and crafts during the low tide.

The fishing community of Isla Conchaguita is located in the open bay towards the east of the island. There is a sandy beach at the bottom of the sea, protected by a masonry bank. There are no mooring facilities for the fishing vessels and crafts during the low tide nor roads suitable for vehicles of any type.

Out of the three islands, the Isla Meanguera community is the only one with a wharf. However, since the corridor is too high as compared to the sea level, it is not used to unload the catch but only to unload the goods arriving at and departing from the continent during the high tide. The end of the wharf is located at the tip of the point of the island and vessels are at risk of hitting the base of the concrete posts during the low tide.

The earthquake that took place in January 2001 has caused serious damages to the infrastructure including the fisheries infrastructure in El Salvador. Subsequently, the following work were executed including the rehabilitation of the destroyed infrastructure utilizing funds authorized for reconstruction (US $2.3 million) obtained through the privatization of the national telephone company (FANTEL).

Table 8-1: Content of the work by the authorized funds for restoration.

Location	Description of damages	Description of the reconstruction work	New Work
Acajutla	Detachment of the breakwater piers	Reinforcement for the breakwater piers	
La Libertad	Break-off of the pier foundations	Reinforcement of the pier foundations	
El Triunfo	Collapse of part of the pier	Pier Reparation and CENDEPESCA's office	
Isla Tasajera	Was not affected by the earthquake in particular	Construction of the jetties for coastal fisheries	Construction of a fishing tackle store
La Colorado	Total damage to the pier	New Pier	
El Pirrayita	Was not damaged by the earthquake in particular	Reparation of the pier and the offices of CENDEPESCA	Humid laboratory and artisanal pier
Puerto Parada	Was not damaged by the earthquake in particular		Disembarkation Infrastructure rehabilitation of artisanal fisheries

Source: CENDEPESCA

Below are described other projects of the fishery administration sector that will be implemented in the coming years, in relation with the works mentioned before. These will be implemented in the localities where CENDEPESCA has zonal offices.

Acajutla

It has been proposed to the fishers the collection of tariffs for the utilization of wharfs (¢2/per time), which was proposed in the Fishery Law but which was not being implemented.

La Libertad

At the moment, construction of a fish market is being planned in the land of the old customs to the north of the existing wharf. As the existing wharf is very narrow, only the boats that obligatory need to should use the wharf the plan for the construction of a new fish market justifiable. In February 2002 the order to begin the enforcement of the base of the pier was given. There is a project profile on the construction of a mariscos market that will be put under consideration to the Japanese embassy.

La Pirrayita

La Pirrayita (selected location for JICA's Technical Cooperation Project for the cultivation of mollusks) in the Jilisco Bay a Humid laboratory and an artisanal pier were constructed.

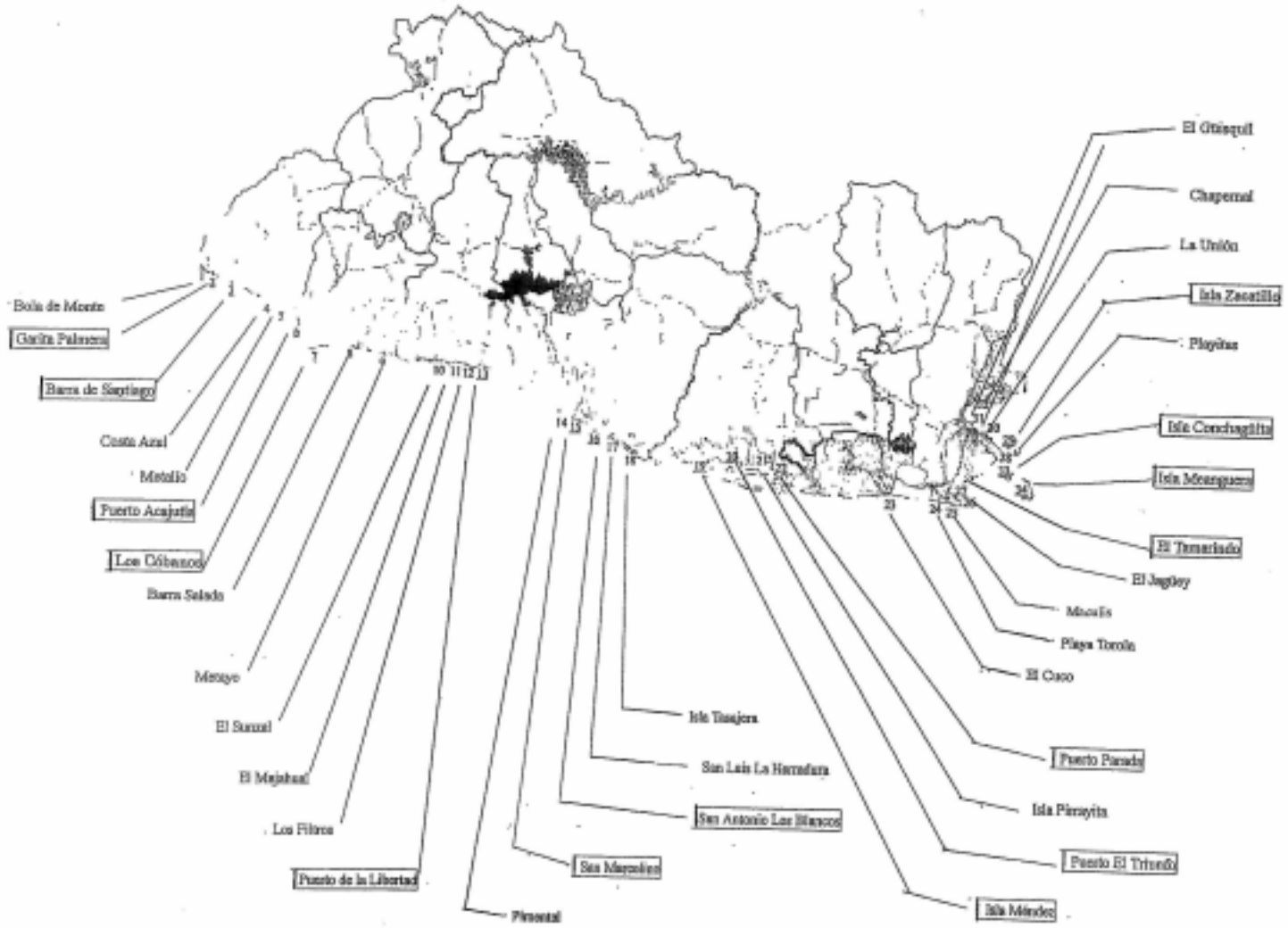


Figure 8-1: Priority Fishing Communities

: Selected Fishing Ports and Villages

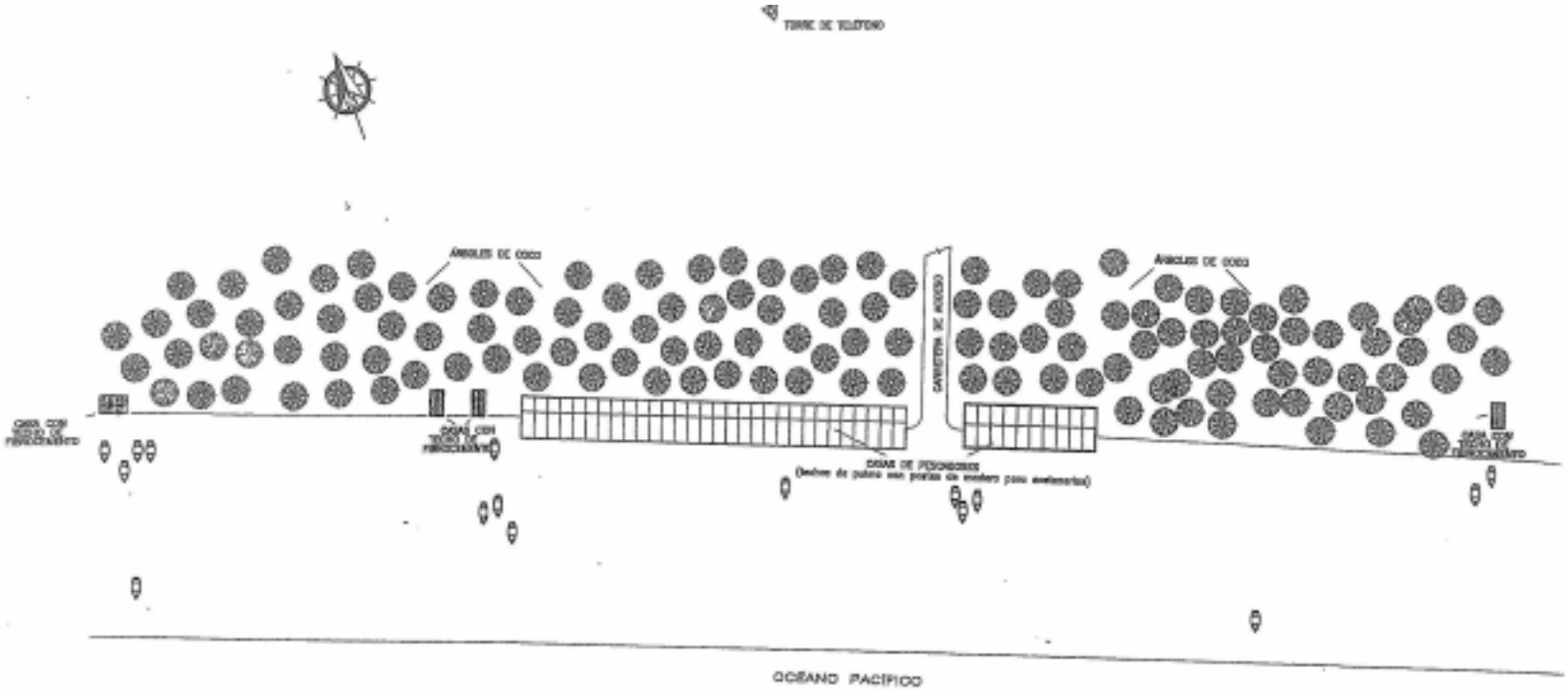


Figure 8-2: Garita Palmera Fishing Community

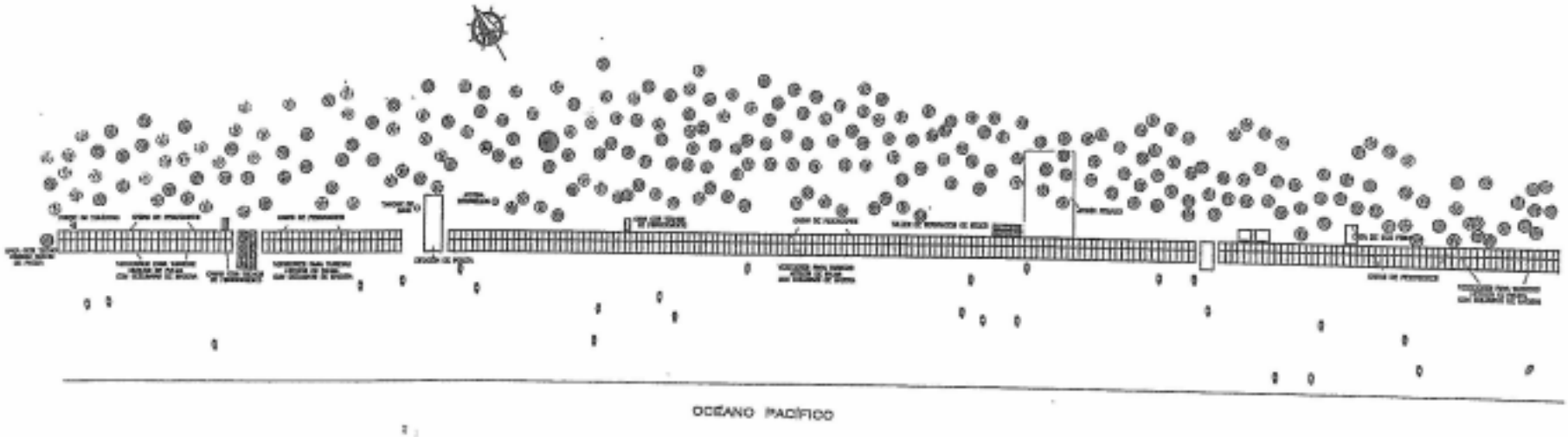


Figure 8-3: Barra Santiago Fishing Community

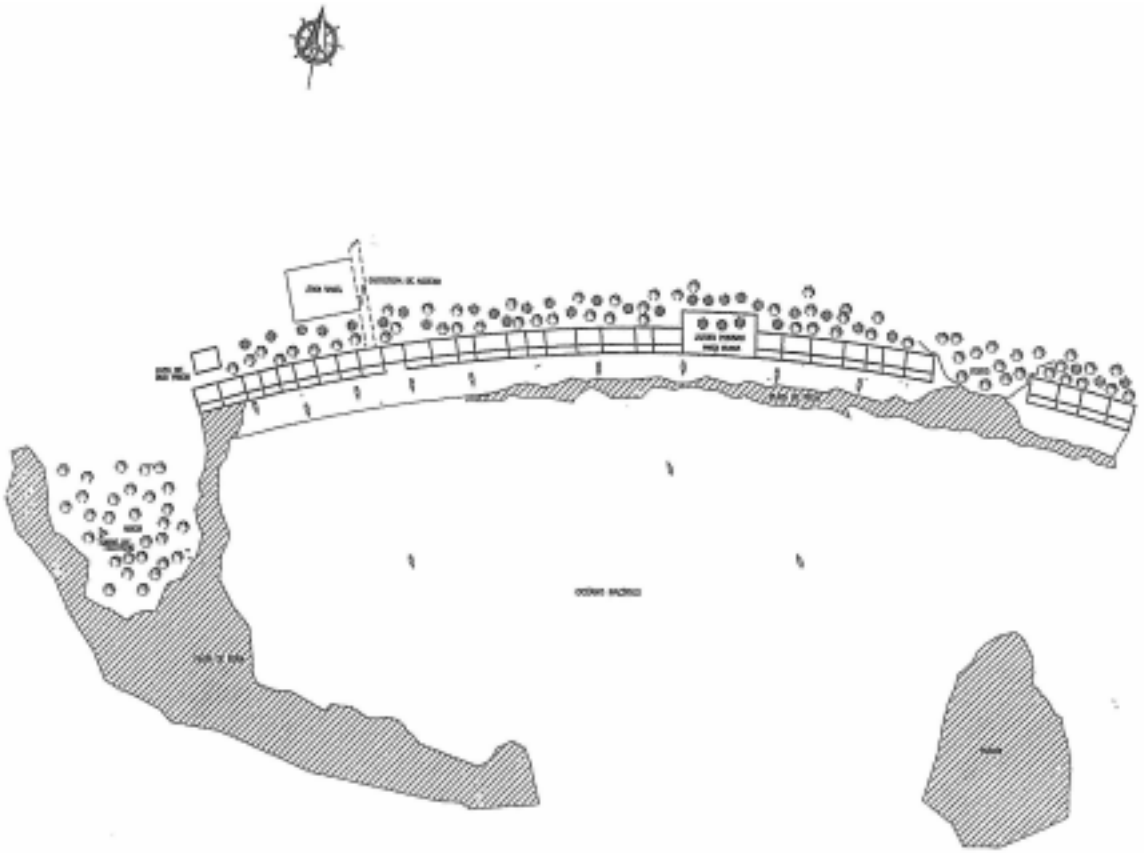


Figure 8-4: Los Cóbanos Fishing Community

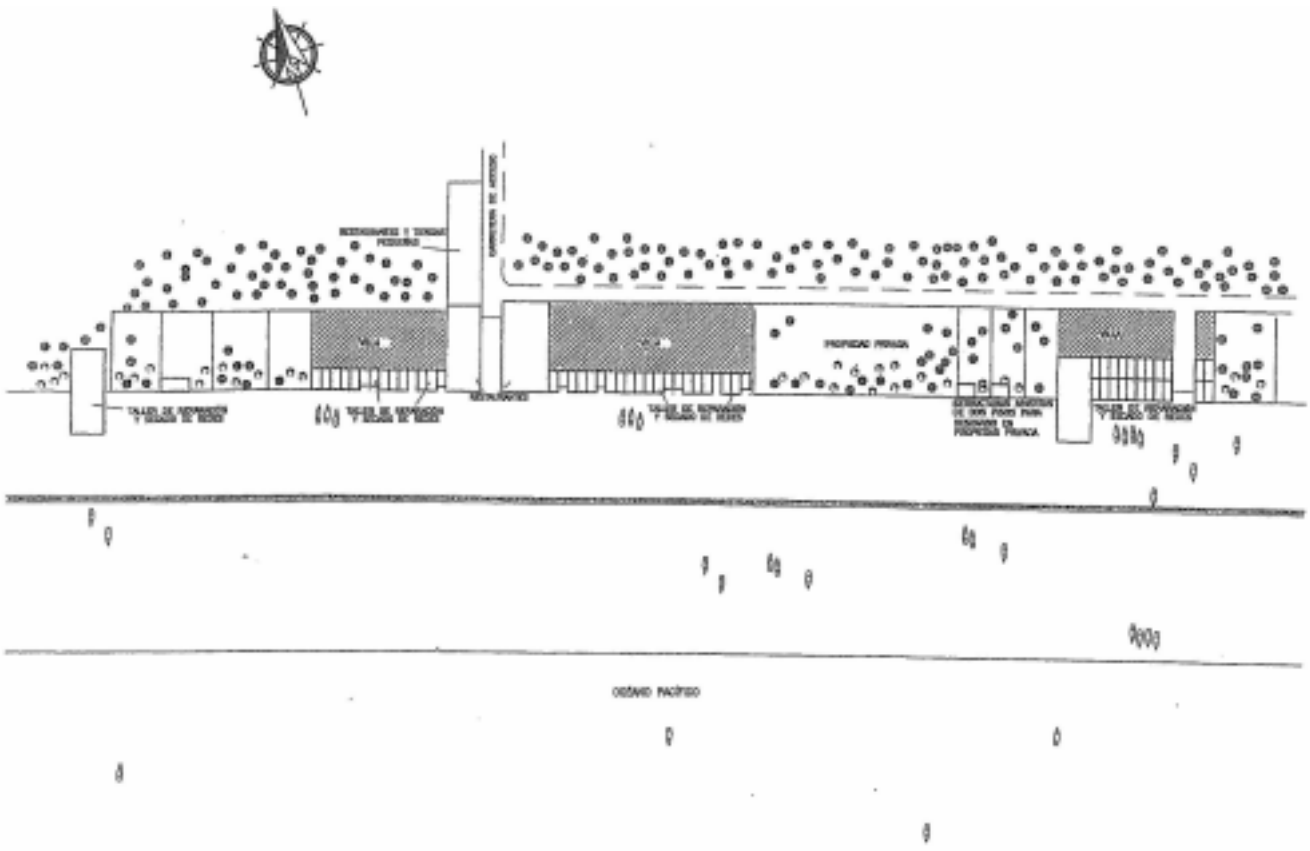


Figure 8-5: San Marcelino Fishing Community

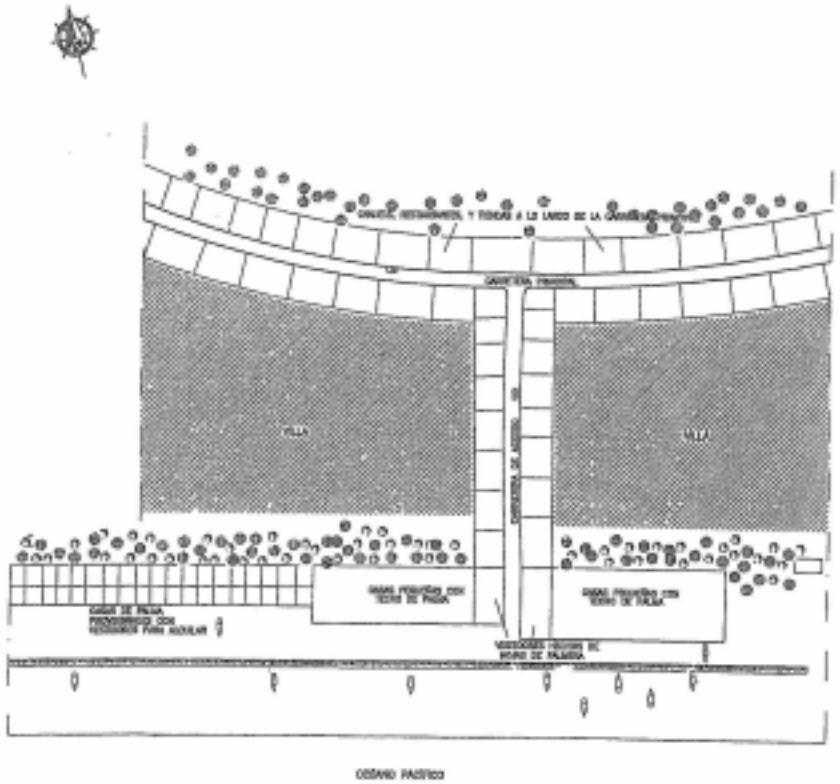


Figure 8-6: San Antonio Los Blancos Fishing Community

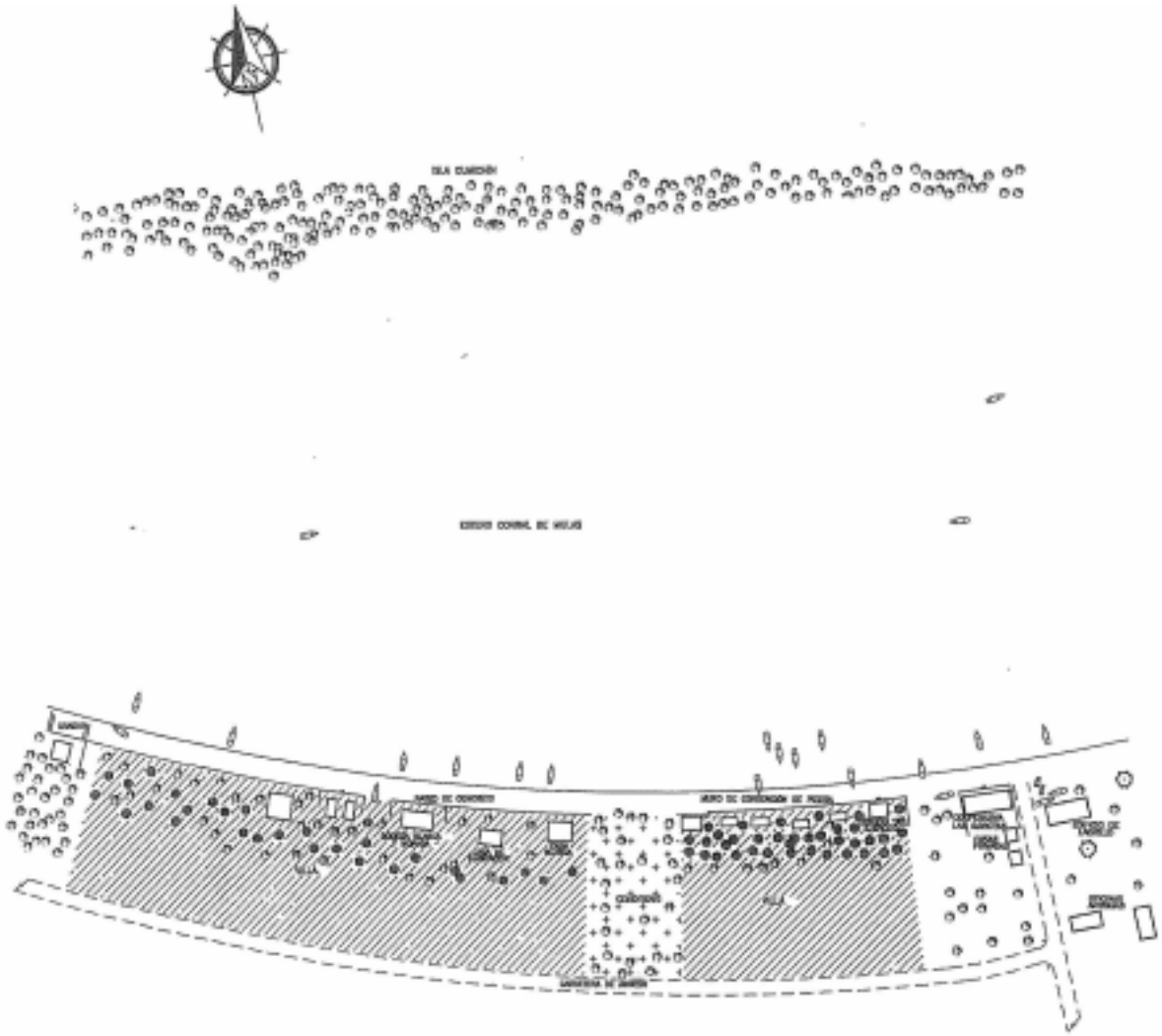


Figure 8-7: Isla de Mendez Fishing Community

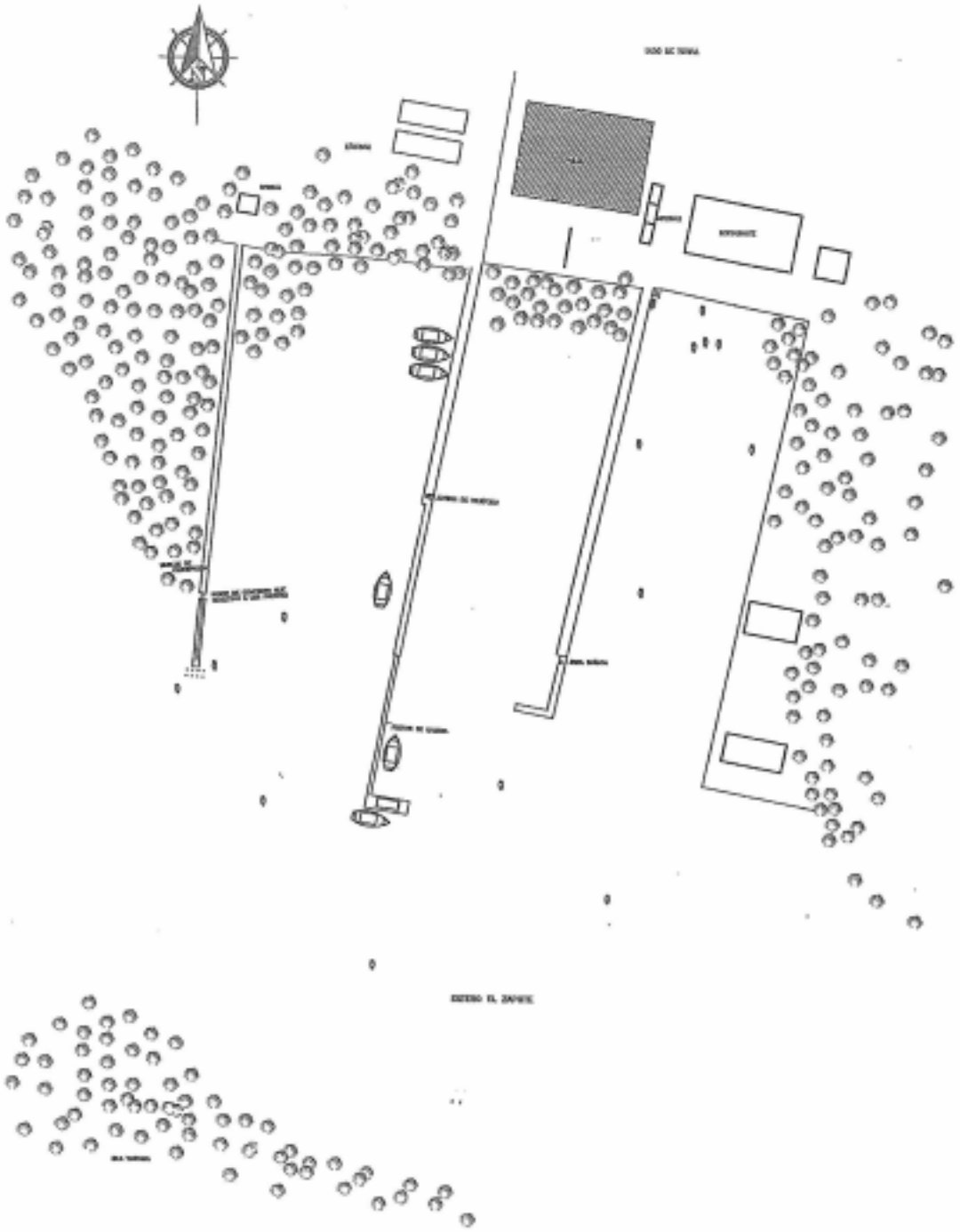


Figure 8-8: Port El Triunfo Fishing Community

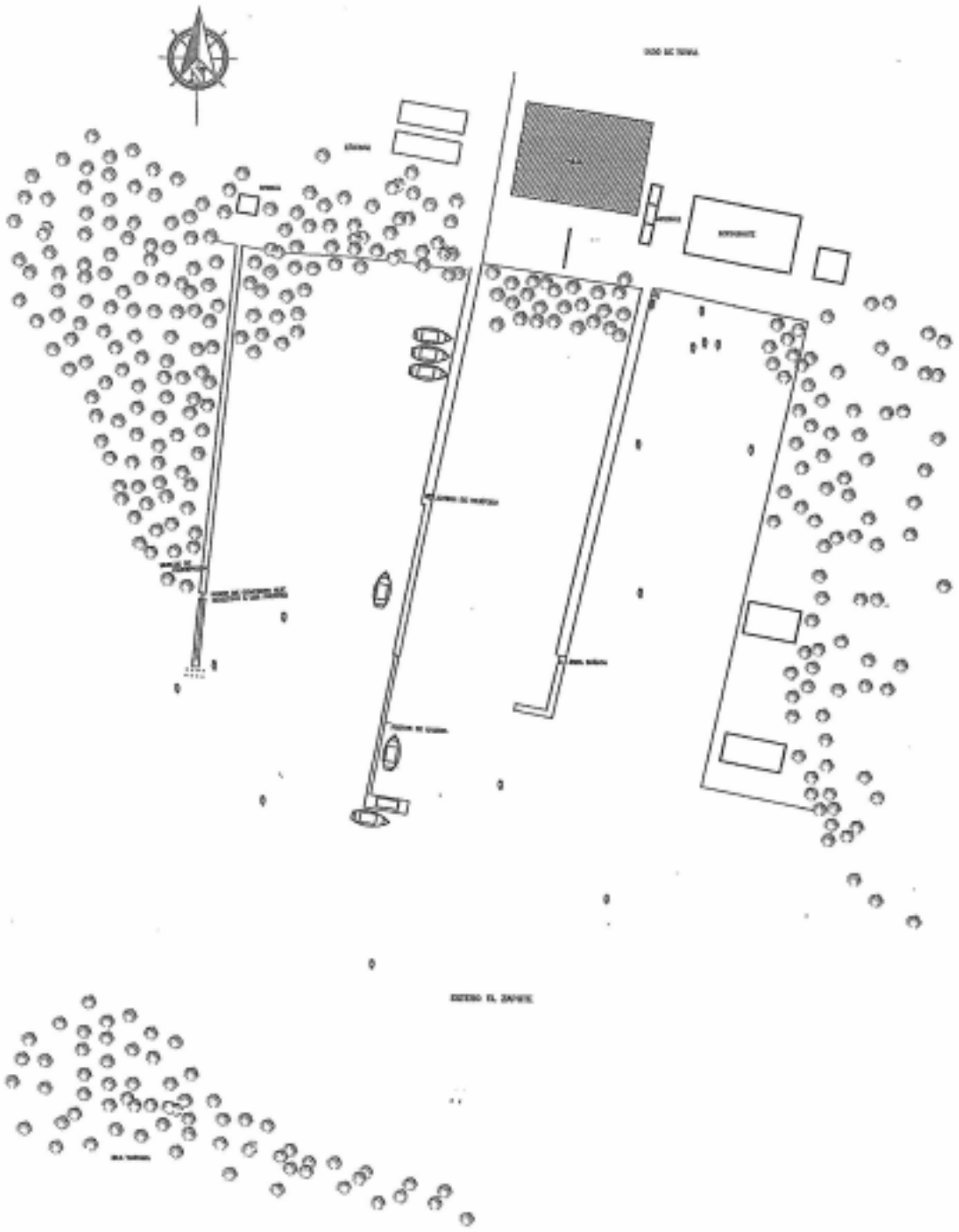


Figure 8-8: Port El Triunfo Fishing Community

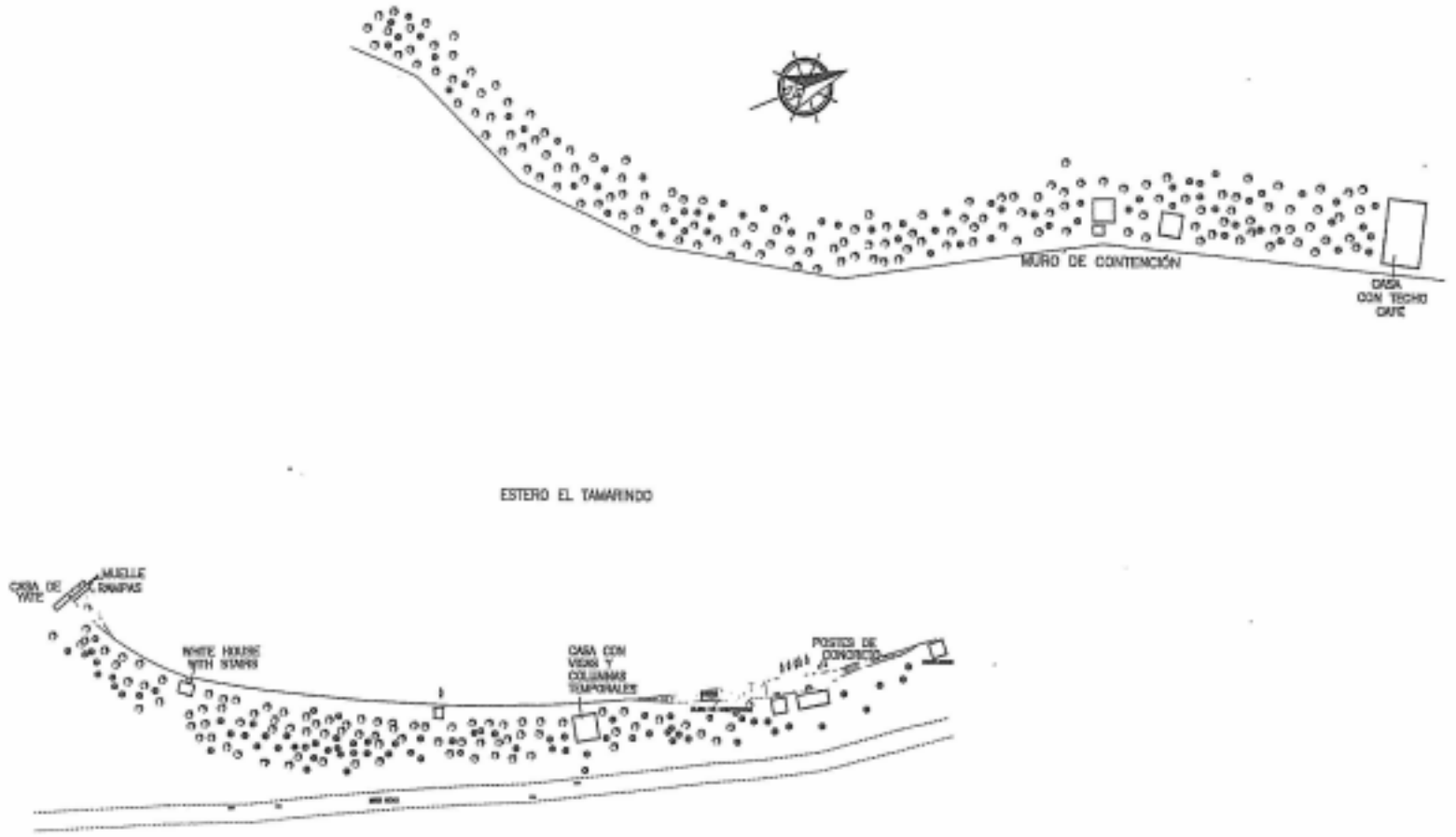


Figure 8-10: El Tamarindo Fishing Community

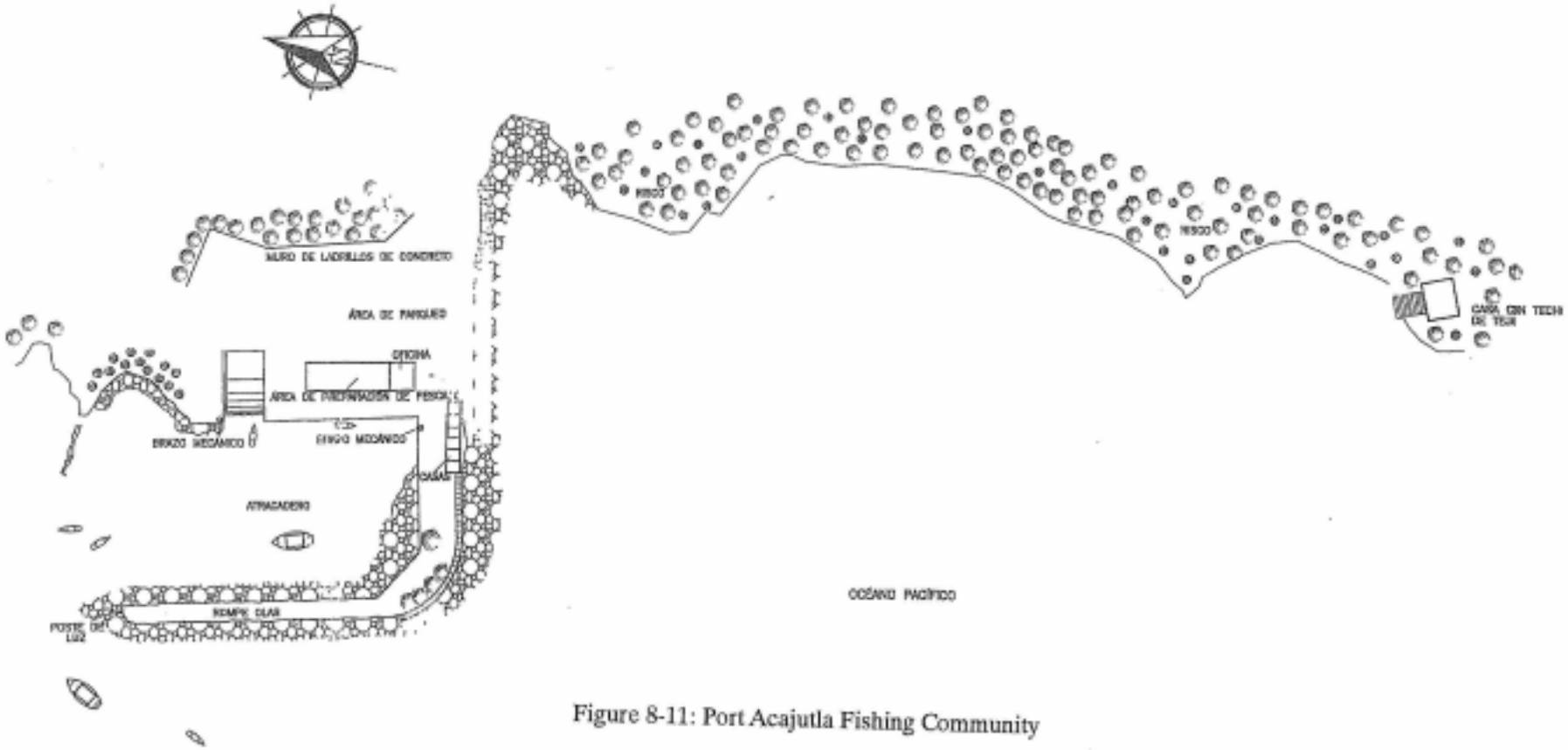


Figure 8-11: Port Acajutla Fishing Community

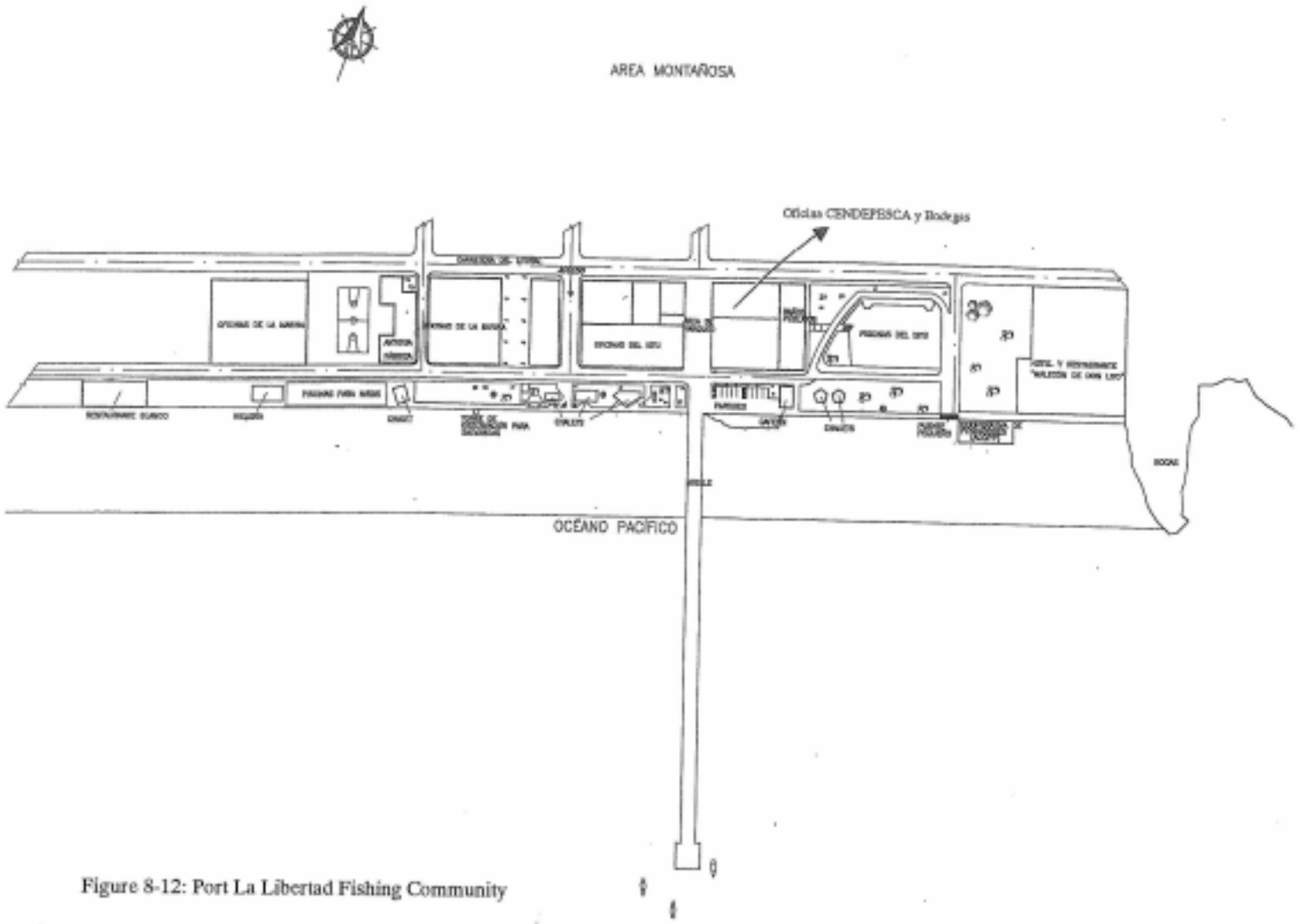


Figure 8-12: Port La Libertad Fishing Community

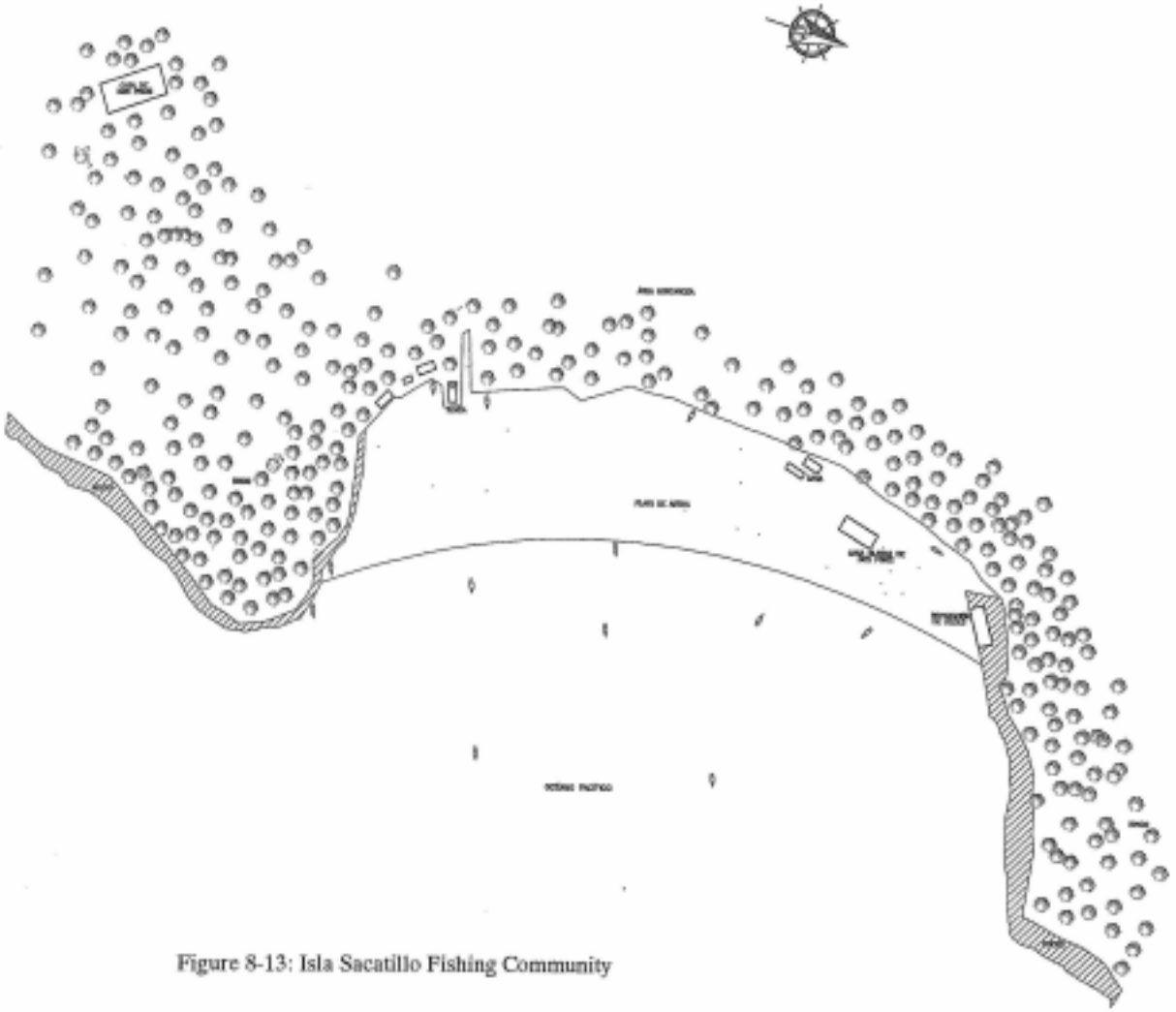


Figure 8-13: Isla Sacatillo Fishing Community

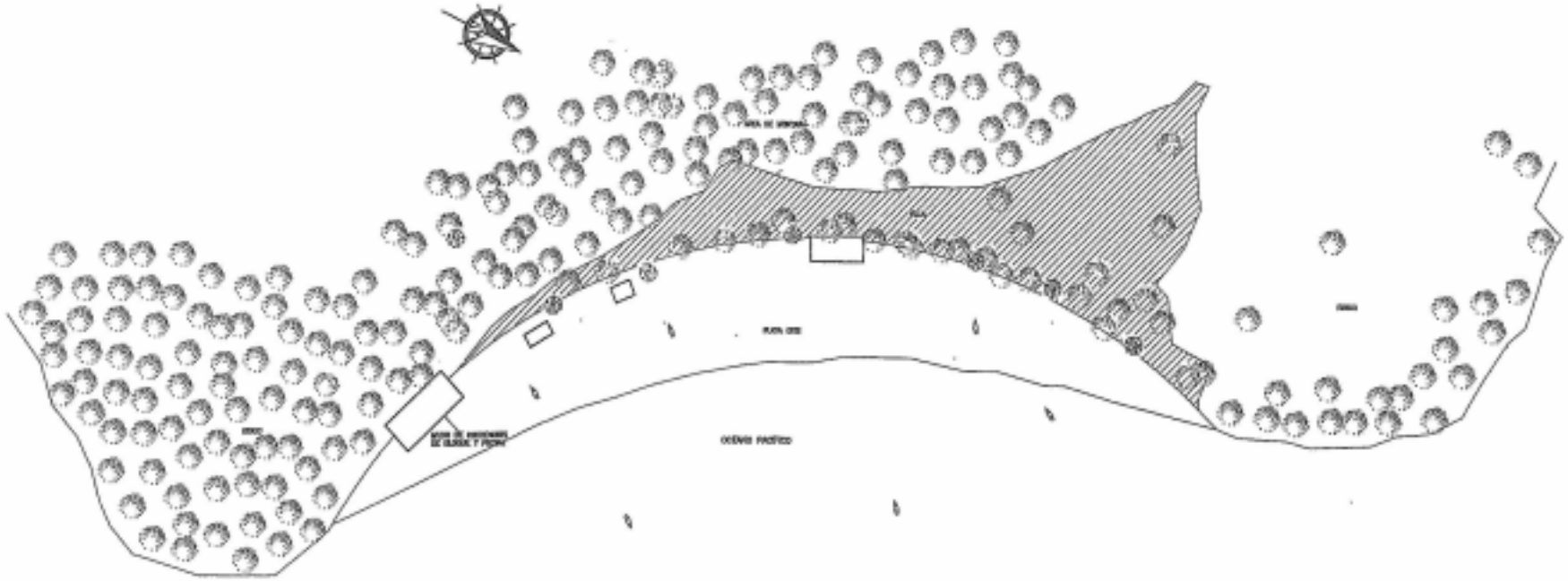


Figure 8-14: Isla Conchaguita Fishing Community

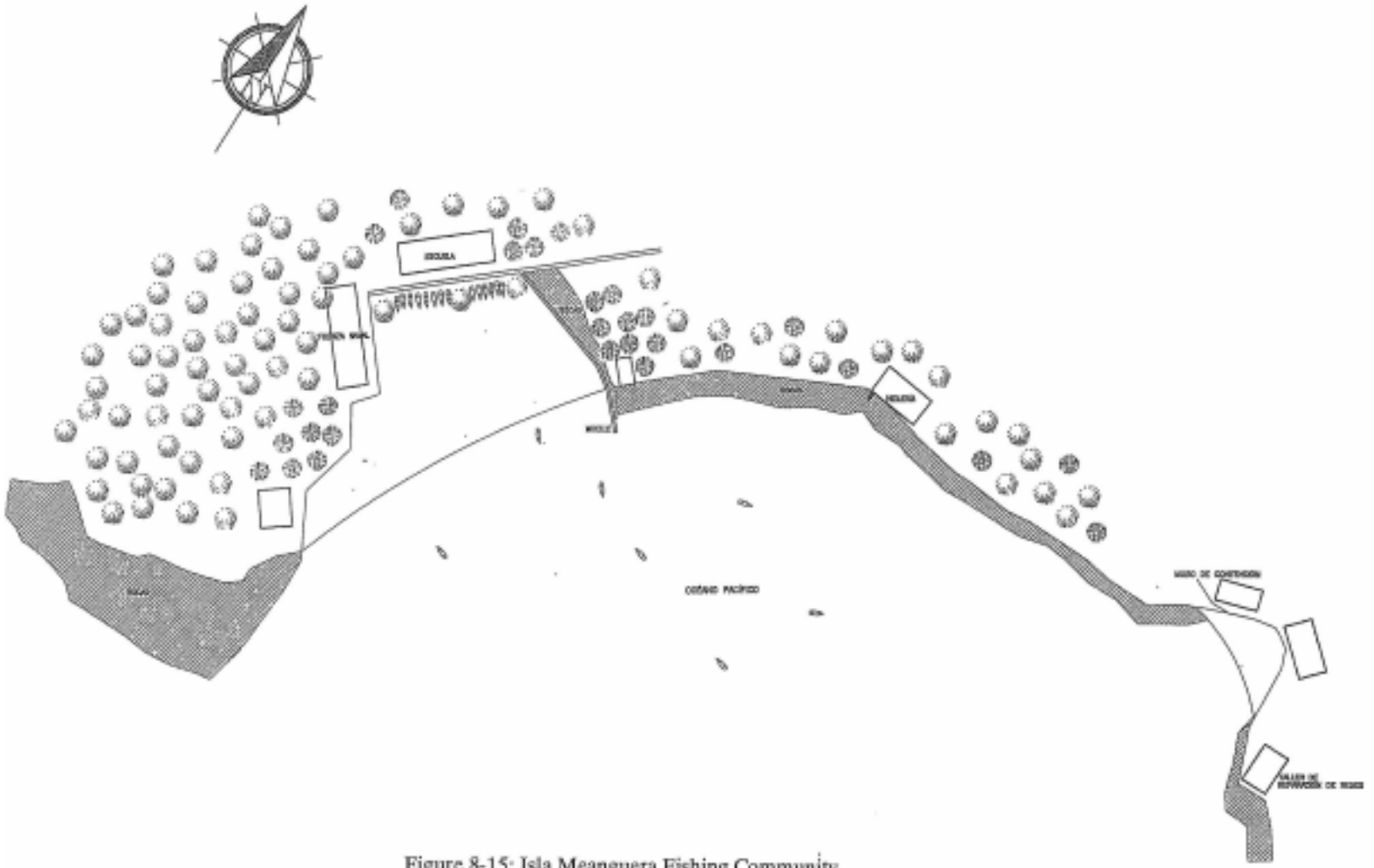


Figure 8-15: Isla Meanguera Fishing Community

8.2 Fishing Infrastructure Improvement Requirements

8.2.1 Basic Guidelines

Notwithstanding the level of the social and port infrastructures of the fishing communities of El Salvador is inadequate, as it was mentioned above, it is difficult to make investments in fishing port infrastructure due to the national economic situation and the cost-benefit ratio of the investments in the fishing sector. This situation poses the need to promote development with a special focus on fishing ports and communities showing high productivity levels. At the same time, it is important to execute the work utilizing to the most possible extent the available equipment and materials in the local market. From this point of view, it is necessary to minimize the use of imported materials and utilize first and foremost locally produced goods defining the degree of construction of infrastructure in accordance to the technical level of the country.

8.2.2 Natural Conditions

(1) Meteorology

According to the Year 2000 Report of the Meteorology Department of the MAG, there are 15 authorized meteorological stations in the country. The data produced by three of these stations that are close to the coastline were used in the present Study.

Station	North Latitude	West Longitude	Altitude
1) Acajutla	13 34.4’	89 50.0’	15 m
2) San Diego	13 28.9’	89 13.2’	20 m
3) La Unión	13 19.9’	87 53’	95 m

With the exception of the Acajutla Port, the fishing communities and ports are located in the plains. They are directly affected by the sea winds notwithstanding the maximum speed of the wind is relatively low.

(2) Direction and Speed of the Wind

Data on the prevailing direction of the wind in a period of ten years comprised between 1990 and 1999 according to meteorological observations are presented below:

	Direction of the wind	Average speed of the wind (Beaufort scale)	Maximum speed (Beaufort scale)
- Puerto Acajutla	N – NE	1 - 1.4	3 - 5
- San Diego	S	1 - 2.5	No data
- La Unión	E - S - SW	1.2 - 2.9	3 - 6

Beaufort scale 1 : 1 – 6 km/h
Beaufort scale 2 : 6 – 11 km/h
Beaufort scale 3 : 12 –19 km/h
Beaufort scale 4 : 20 – 28 km/h
Beaufort scale 5 : 29 – 38 km/h
Beaufort scale 6 : 39 – 49 km/h

(3) Hours of Sunshine

The average hours of Sunshine is 12:29 with a minimum of 11:18 in November and a maximum of 12:57 in June.

(4) Rainfall

In the Acajutla Port, the annual rainfall for the ten-year period comprised between 1990 and 1999 ranges from 1242 to 2280mm. Rainy days reach their peak in July, while between January and February the rain is nil. In San Diego, it ranges from 1291 to 2193mm (between 1973 and 1979, data for the subsequent years were not taken), with rainy days reaching their peak between June and August while between January and March, the rain is nil. At La Unión, the annual rainfall ranges from 1167 to 2123mm, with rainy days reaching their peak between June and July, while between December and February the rain is nil.

(5) Evaporation

There is no official data.

8.2.3 Hydrographic Conditions

(1) Marine Waves

The prevailing direction of the marine waves shows great variations between the rainy and the dry season. Normally, in the Pacific coast of Central America a great incidence of waves is observed with a NW and NE direction during the rainy season, reaching a maximum of 4.3 to 6.2 m. However, in the specific case of El Salvador, the NW and NE winds hit the hills and do not have any effect on the sea. The prevailing waves in the coast go from S to W, reaching a height that ranges from 0.1 to 2.2 m. They refract in the high sea and their height is reduced to approximately 1.8 because of the friction against the bottom of the sea.

During the dry season, the prevailing waves move to the south with a height ranging from 2.3 and 4.2 m. These waves are refracted in the high tide and their height is reduced to 1.8 and 3.4 m before reaching the coast as a result of the friction against the bottom of the sea.

(2) Tide Level

In El Salvador, tide levels are observed in three stations: Puerto Acajutla, Puerto de La Libertad and La Unión. The spring and neap tide levels differences in the Acajutla Port are 2.2 and 2.0 m, respectively; at La Libertad, 2.5 m and 2.1 m, respectively; and at La Unión 3.0 m and 1.8 m were recorded for the high and the low tide, respectively.

(3) Tidal Current

Even though the origin of the currents at the north of the equator is unknown, an average current speed between 0.5 and 1 knot has been detected in the Pacific coast of El Salvador between latitudes N 10°-20°. It is produced by the California Current and seawaters coming from the Eastern Tropical Pacific. The influence of the California Current prevails in the summer, while in the influence of the inverse equatorial current prevails in the winter and fall. In any case, as it is shown in the Figure, the currents of the Salvadoran coastline correspond to the area between the north equatorial currents and the inverse equatorial currents.

No elements represent an obstacle to the currents of the Salvadoran coastline, thus currents are weak. Their speed is comparable to other currents. The currents in the great bays such as La Unión and Fonseca may have a speed ranging from 0.5 to 2 knots at the mouth of the bay because of the influence of local winds that increase the tide level.

8.2.4 Geographical Features

(1) Geology of the Coastline

The coastal geology of the fishing communities and ports scattered alongside the western coastline of the country is made up by alluvial deposit mostly covered by sand. The bay of the northern sandy land of the coast also has the same texture with some variations resulting from mud carried by the rains or waste waters.

The geology of the Costa del Sol Beach in the central coastline is also made up by alluvial deposit. Beaches are covered by sand. The Jiquilisco Bay is made up by alluvial deposit as well. The coastline and the stripe that goes from the center to the west of the bay are covered by a layer of sand. At El Triunfo Port, a deposit of mud carried by wastewaters and rainfall is observed at the bottom of the eastern bay. The coastal stripe of the bay is made up by low lands covered by mangroves on a sandy base. The eastern coast El Tamarindo is located in the low land made up by laterite soil (clayey-reddish latosoles, alphisole lithosoles). On the other hand, the skirts of the abrupt mountains enter directly into the sea in La Unión islands. Sediment

dragging is not observed here due to the absence of rivers. The soil is made up by clayey and sandy latherite with a thin superficial layer over a basic layer of weathered rocks.

(2) Coastal Support Resistance

Garita Palmera and Barra de Santiago are fishing communities with sandy beaches in the west of El Salvador. The sand in both communities presents a homogeneous granulometry with little consolidation thus facilitating the penetration of steel bars. It can be said that the sand reaches a depth of more than 1.5 m.

The soil of the Acajutla Port is solid, constructions are made on a basic layer of weathered sedimentary rocks, and therefore structures are not at risk of sinking. The sea area where the breakwater dike is built seems to be made up by a thin layer of sand resting on a rock base. In order to keep the depth level, sedimentary sands are dredged inside the port once every several years. Nearby precipices present weathered rock outcropping and it is therefore deducted that the soil support capacity in the area where the embarkation park is located is high.

The coast of Los Cóbanos is covered by a layer of white brownish sand and rocks and pebbles are scattered in the bottom of the sea. Due to the presence of a rocky base, steel bars only penetrate very little. Rocks are independent and the space between rocks is filled with a mixture of sand and gravel. The overall support capacity of the soil is high.

La Libertad Port is on soil made up of sand and pebble. The cape nearby the bay presents weathered rock outcropping and there is no sand sedimentation. The wharf is surrounded by a sandy beach and driven concrete posts. It can be said that the rock layer is on a relatively deep area. Settled pebbles are found around the coastline protection works and based on the steel bar penetration tests at the beach it can be assumed that there is a solid rock or pebble layer at less than 1 m deep.

The beach of the San Marcelino community is mostly sandy. However, there is a very solid sand layer and based on the steel bar penetration tests it can be assumed that there is a solid base at less than 1 m deep. The coast stretches in a straight line from WNW to WSE and the San Antonio Los Blancos beach is towards east of the San Marcelino community, which is also mostly sandy. Based on the steel bars penetration tests at the beach it can be assumed that there is a solid base at less than 1m deep from the surface.

The Isla de Méndez community is at the west bottom of the Jiquilisco Bay. The beach

is sandy in this area. The community is located in the low sandy land with a mixture of slime due to the presence of trees. Since the posts to dock the fishing boats have been placed in this area, it is assumed that the sandy layer is loose.

El Triunfo Port is located on marshy soil. The port and its surroundings are on a low land planted with mangroves with shallow waters and a wide distribution of slimy clay soil. It is a loose soil which allows an easy steel bar penetration.

The Parada Port is located at the shore of a river that flows to the low land at the bottom of the Jiquilisco Bay. The soil is made up by slimy sediments thus giving origin to the soft soil at the water edge.

El Tamarindo community is distributed in the low land of the bay alongside the coastline. The surface of the coast is made up by sand and slime thus giving origin to a soft soil. According to the steel bar penetration test, a rigid layer is settled at more than 1 m from the surface level.

In the Isla Zacatillo community, the superficial soil is marked by the presence of weathered rocks. Under the coastline precipices, rocks are surrounding the place forming a breakwater dike. The community is located at the bottom of a relatively flat sandy beach. Since the base is at very little depth, the loose sand layer is thin.

The coast of the Isla Conchaguita community is made up by a thin layer of gravel and thick sand. The rock base is at little depth.

The Isla Meanguera fishing community is made up by two bays. A thin layer of sand and gravel is scattered throughout the beach. There are large amounts of settled weathered rocks in the cape between the two bays. There is a wharf but a concrete foundation has been built on the rock base instead of driven posts.

(3) Coastline Displacement

In order to build a new port in the fishing communities located in sandy beaches, it is necessary to build breakwater or longitudinal dikes, which would give origin to the sedimentation of upstream land of the structures with the subsequent downstream erosion. Moreover, after building the structures, the beaches would start modifying their structures through the displacement of sand seeking for a new balance. Since such movement in the area brings along the sinking of the port, the construction of ports on sandy beaches has been traditionally avoided.

Such is the case of the Garita Palmera and Barra de Santiago communities in the north

of the country as well as the San Marcelino and San Antonio Los Blancos of the subcentral region. However, since at present it is not relevant to build new ports in these communities at short, medium or long term, details of the coastline displacement problem will not be covered in this document.

Furthermore, a sandbank built up at the entry that connects the Jiquilisco Bay (central region) and the high sea and due to its little depth during the low tide prevents the passage of even small fishing boats with shallow draft. Additionally, due to the prevailing waves from the high sea as a result of seasonal variations, the sand is lifted from the shallow sea bottom thus provoking complex changes in the depth of the sea bottom. The sand movement becomes more intense at a depth of approximately 5m to 6m (breakwater area) and it is then assumed that the sandbank formed because of sand movement.

One of the alternatives presented is dredging the sandbank in order to define a route to allow the permanent passage of vessels. However, although the necessary navigation depth and width are ensured through dredging, it would only be transitory if a dike is not built to provide protection against the sand, and within few days, the original topography would be recovered due to the intense sand movement under natural conditions. In case a sand dike is built by using steel posts to stop the influence of sand displacement up to a depth over 6 m between the bay and high sea, this channel would allow the permanent passage of vessels from the bay to the high sea. Nevertheless, the incorporation of the construction of this type of channel in the mid and long term infrastructures is premature within the Artisanal Fishing Development Plan Study framework. Instead, these works should be considered in the future within a Comprehensive Development Plan of the Jiquilisco Bay, also taking the credit securing issue into account.

8.2.5 Social Conditions

In the past, many of the fishery infrastructure constructed in ports in developing countries had been under utilized by the fishers or not properly utilized due to the lack of a clear division of responsibilities concerning its operation and maintenance. In the specific case of El Salvador such cases with marked importance have not been reported. However, a new infrastructure construction project which not only meets the physical and structural needs but also the non-structural necessities such as defining administrative actions to give an adequate maintenance to the new infrastructure in the long term and the strengthening of fishers organizations. In that case, the following aspects should be analyzed.

① The economic capacity of users to afford the operation costs (service tariffs) in the case infrastructure is administered by the public sector such as the case in Acajutla. In addition, it is necessary to analyze the possibility of imposing the obligation to utilize the infrastructure or to gain consensus of the users to pay the costs.

② Presence of capable users' organizations for the operation and maintenance of infrastructure.

③ Analyze if infrastructure construction will be an incentive to organize fishers in communities where organizations do not exist or where it is not solid enough.

Chapter 9 Organization of Fishers

9.1 Current Status of the Organization of Fishers

9.1.1 Fisheries Cooperatives Profile

If the "organization of fishers" is considered as a fishing entity with legal capacity, then the only organizations of fishers in the artisanal sub-sector in El Salvador are the cooperatives.[1] Fisheries cooperatives are obliged to register in the Department of Agricultural Associates in the Ministry of Agriculture. Table 9-1 shows a list of fishery cooperatives registered in the above-mentioned department as of November 1, 2000. According to this information, from the 91 cooperatives registered, 61 carry out fisheries operation at open waters and estuary.

The registry also specifies the state of operations of the cooperatives. However, the data are not appropriately updated and do not always reflect the actual conditions. According to it, of the 62 fishery cooperatives that operate in the coast (including two federations), 42 are "operating ". However, in reality there are only 14 cooperatives operating.[2] There are 382 members in these cooperatives, which represents only 2.7% of the 14,000 existing fishers in the country[3] (if taking into account members of cooperatives which state of operation is unknown the percentage is 2.9%). Therefore, this group of fishers is not the most representative within the national artisanal fishers population.

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1 Through the RRA the existence of fishers' organizations in 18 of the 34 communities studied were identified. In these 18 communities, 21 organizations in total exist of which 19 are fishery cooperatives. Of this data, it can be asserted that the majority of the fishers' organizations are fishery cooperatives. For more detail, refer to the Annex (Results of the RRA).

2 During the field study, interviews to cooperatives took place which results are shown in Table 9-1 in colored cells. Blue cells correspond to cooperatives in operation; the red cells are cooperatives that have temporarily suspended operations and the yellow ones are cooperatives that state of operation is unknown.

3 According to PRADEPESCA study in 1995, there are 13,000 in shore artisanal fishers. If the vegetative growth of the six following years is taken into account, CENDEPESCA estimates that this population totals 14,000. Nevertheless, this figure does not include mollusk collectors and they also are part of the artisanal fishers population; therefore, the real total of this group should be higher.

Table 9-1 Lists of Fisheries Cooperatives in El Salvador

	Name of Cooperative Current State→ Active Inactive Unknown	Year of Estab.	M	F	State	Departament	Municiparity	Community	Area of activity	Notes
1	Asoc.Coop.Pescad.Puerto de Acajutla	1981	53	1	**Active**	Sonsonate	Acajutla		**Sea**	
2	Asoc.Coop.Prod.Camaron.El Gavilán, de R.L.	1991	19	6	**Active**	Usulutan	Usulutan		**Sea**	
3	Asoc.Coop.Prod.Pesq.Puerto Parada	1981	21	0	**Active**	Usulutan	Salinas	P. Parada	**Sea**	Estuary
4	Asoc.Coop.Prod.Pesq.Isla de Méndez de R.L.	1982	31	0	**Active**	Usulutan	Jiquilisco	Isla de Mendez	**Sea**	Estuary
5	Asoc.Coop.Prod.Pesq. El Pacifico de R.L.	1983	87	0	**Active**	La Unión	Maculis	Llano Los Patos	**Sea**	
6	Asoc.Coop.Prod.Pesq.Pto. El Triunfo de R.L	1983	30	0	**Active**	Usulutan		P. El Triunfo	**Sea**	Estuary
7	Asoc.Coop.Prod.Pesq.Mar y Cielo de R.L.	1980	15	0	**Active**	La Paz	Zacatecoluca	Herradura	**Sea**	Estuary
8	Asoc.Coop.Indust.Pesc.Pto.Parada de R.L.	1980	16	0	**Active**	Usulutan	Salinas	P. Parada	**Sea**	Estuary
9	Asoc.Coop.Prod.Pesq.y Serv.Mult.Pto.El Tiunfo	1981	20	0	**Active**	Usulutan		P. El Triunfo	**Sea**	Estuary
10	Asoc.Coop.Prod.Pesq.Isla Rancho Viejo	1981	23	0	**Active**	Usulutan	San Dionicio	Rancho Viejo	**Sea**	Estuary
11	Asoc.Coop. de Pescadores de El Puerto de La Libertad.	1981	31	0	**Active**	La Libertad		Playa La Paz	**Sea**	
12	Asoc. Coop. Prod. Pesquera San Antonio Los Blancos.	1983	60	0	**Active**	La Libertad			**Sea**	
13	Asoc. Coop. De Pescadores La Bahía , de R.L.	1983	19	2	**Active**	La Paz		San Antonio Los Blanco	**Sea**	
14	Asoc.Coop.Prod. Pesquera Playona Isla de Zacatillo.	1984	11	5	**Active**	La Unión	Isla Zacatillo	Playona	**Sea**	Estuary
15	Asoc.Coop.Prod.y Servicios Pesqueros Isla Tasajera.	1987	24	0	**Active**	La Paz	San Luis Herradura	San Rafael Tasajera	**Sea**	
16	Asoc.de Trabajadores Agropecuaria y Pesq.del Pacífico.	1987	19	2	**Active**	La Paz	San Luis Herradura	San Antonio Los Blanco	**Sea**	Estuary
17	Asoc.Coop.Prod. Pesq. Brisas de Jaltepec.	1987	14	2	**Active**	La Paz	San Luis Herradura	El Zapote	**Sea**	Estuary
18	Asoc.Coop.Prod.y Servicios Pesqueros Los Halcones.	1988	22	1	**Active**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
19	Asoc.Coop.Prod.y Serv.Pesq. Lempa Mar.	1989	17	0	**Active**	La Paz	San Luis Herradura	Isla Cordoncito	**Sea**	Estuary
20	Asoc.Coop.Prod.y Serv.Pesq.de Mujeres El Milagro La Herradura.	1989	0	17	**Active**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
21	Asoc.Coop.Prod.Pesq.y Serv.Mult.Pacifico Azul.	1989	22	3	**Active**	Usulutan		P. El Triunfo	**Sea**	Estuary
22	Asoc.Coop.Prod.Serv.,Agrovisionamiento Pesq.Rep.y Talleres Marinos Retamar	1990	22	0	**Active**	La Paz	San Luis Herradura	Herradura	**Sea**	**Not fishing coop..**
23	Asoc.Coop.Prod. Agrop. Pesq. Mar y Conchas.	1991	33	0	**Active**	La Paz	San Pedro masahu	San Marcelino	**Sea**	Estuary
24	Federación de Coop.de Prod.y Servicios Pesq. La Paz.	1991	9	0	**Active**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
25	Asoc.Coop.Prod.Comercializ.y Servicios Pesq.El Dorado.	1991	14	1	**Active**	La Paz	San Luis Herradura	Col. Beltran	**Sea**	Estuary
26	Asoc.Coop.Pesq. Mujeres Pescadoras Las Gaviotas.	1991	0	20	**Active**	Usulutan	Jiquilisco	Isla de Mendez	**Sea**	Estuary
27	Federación de Asociaciones de Coop.Pesqueras Artesanales de El Salvador	1993	13	0	**Active**	La Libertad	P. Libertad		**Sea**	
28	Asoc.Coop. Prod. Pesquera La Chacatera.	1993	6	14	**Active**	Usulutan	Jiquilisco	La Canoa	**Sea**	Lempa river
29	Asoc.Coop.Prod.Agrop.y Pesq. Rayo de Luz.	1995	37	4	**Active**	La Paz	San Luis Talpa	Pimental	**Sea**	
30	Asoc.Coop. Prod.Pesq. Aguilas Marinas.	1996	19	7	**Active**	Usulutan	Jiquilisco	La Canoa	**Sea**	Lempa river
31	Asoc.Coop.Prod. Pesq. Los Morralleros de la Playa Torola.	1996	22	20	**Active**	La Unión	Conchagua	Llano Los Patos	**Sea**	
32	Asoc. Coop.de la Industria Pesquera de El Salvador.	1996	28	0	**Active**	Sonsonate	Acajutla	P. Acajutla	**Sea**	
33	Asoc. Coop.Prod. Pesq. Agroindustrial Rompe Olas.	1996	34	1	**Active**	Usulutan	P. El Triunfo	P. El Triunfo	**Sea**	Estuary
34	Asoc.Coop.Prod. Pesq.y Serv. Multiples Cielo Tierra y Mar.	1997	31	20	**Active**	Usulutan	San Luis Herradura	Herradura	**Sea**	Estuary
35	Asoc. Coop. Pesquera El Golfo de Fonseca.	1997	38	12	**Active**	La Unión	La Unión		**Sea**	
36	Asoc. Coo. Prod.de Pequeños Pescadores y Artesanales Nuevo Zamorancito.	1997	37	6	**Active**	Usulutan	Jiquilisco		**Sea**	Estuary
37	Asoc.Coop. Prod. Pesq.y Serv. Multiples La Pirrayita.	1998	22	9	**Active**	Usulutan	Jiquilisco	Isla San Dionicio	**Sea**	Estuary
38	Asoc. Coop. Prod.y Comercial. Pesq. Perla Marina.	1998	0	17	**Active**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
39	Asoc. Coop. Prod. Pesq. Quince de Julio.	1999	13	12	**Active**	La Libertad	P. Libertad	P. Libertad	**Sea**	
40	Asoc. Coop. Prod. Pesq.y Serv. Multiples La Optimista.	1999	18	0	**Active**	La Paz	San Luis Herradura	El Zapotillo	**Sea**	Estuary
41	Asoc. Coop. Prod. Pesq.y serv. Multiples Las Sirenas.	1999	4	30	**Active**	La Libertad	P. Libertad		**Sea**	
42	Asoc.Coop.Pesc. Artesan.de Mizata de R.L.	----	0	0	**Inactive**	La Libertad	Teotepeque	Mizata	**Sea**	
43	Asoc.Coop.Prod.Pesq. El Tamarindo de R.L.	1983	47	0	**Inactive**	La Unión	Conchagua	Tamarindo	**Sea**	
44	Asoc.Coop.Pesc.Artesan.La Barra Santiago	1980	12	0	**Inactive**	Ahuachapan	Jujutla	Barra de Santiago	**Sea**	
45	Asoc.Coop.Prod.Pesq.Puerto Avalos	1991	0	0	**Inactive**	Usulutan	Jiquilisco	P. Avalos	**Sea**	Estuary
46	Asoc.Coop.Prod.Pesq.Puerto Grande	1981	21	0	**Inactive**	Usulutan	San Dionicio	P. Grande	**Sea**	Estuary
47	Asoc.Coop. Prod. Pesquera La Buena Fé.	1981	26	1	**Inactive**	La Paz	Masahuat	San Marcelino	**Sea**	
48	Asoc.Coop. Pescadores La Bahía.	1984	17	5	**Inactive**	Usulutan		P. El Triunfo	**Sea**	
49	Asoc.Coop.Pescadores Artesanales Zorra y Mar.	1985	30	0	**Inactive**	La Paz	Herradura	Guadalupe la Zorra San	**Sea**	Estuary
50	Asoc.Coop.Indust.Agropesca de Barra Salada.	1986	23	2	**Inactive**	Sonsonate	Salinas de Ayacach	Barra Salada	**Sea**	

51	Asoc.Coop.Prod. Pesquera Luz en el Golfo Jaguey.	1987	20	0	**Inactive**	La Unión	Conchagua	Jaguey	**Sea**	
52	Asoc. Coop. Prod. Agrop. y Pesq. La Esperanza Barra de Santiago.	1988	32	8	**Inactive**	Ahuachapan	Jujutla	Barra de Santiago	**Sea**	Estuary
53	Asoc.Coop.Pesc.Artesanales Los Sábalos.	1988	55	23	**Inactive**	Usulutan	Jiquilisco	Isla de Mendez	**Sea**	Estuary
54	Asoc.Cooperativa Producción y Comercialización Productos Pesq. Cangrejera.	1990	16	0	**Inactive**	La Libertad	P. Libertad	Cangrejera	**Sea**	
55	Asoc.Coop.Prod.Comercialización y Serv. Pesq.de Mujeres Coral Marino.	1991	0	19	**Inactive**	La Paz	San Luis Herradura	San Rafael Tasajera	**Sea**	Estuary
56	Asoc.Coop.de Prod.y Serv. Pesq.Hombres de Mar.	1991	30	8	**Inactive**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
57	Asoc.Coop.Producción y Servicios Pesqueros El Maestro.	1992	38	0	**Inactive**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
58	Asoc.Coop. Prod. Pesq. Delfines del Pacífico.	1993	17	11	**Inactive**	La Paz	San Luis Herradura	El Zapote	**Sea**	Estuary
59	Asoc.Coop.Prod.Pesquera y Agroindustrial La Borda.	1993	0	0	**Inactive**	Usulutan	P. El Triunfo		**Sea**	Estuary
60	Asoc.Coop.de Prod. Pesq. Artesanal La Manglera.	1993	34	22	**Inactive**	La Paz	San Luis Herradura	Herradura	**Sea**	Estuary
61	Asoc.Coop.Los Ostreros del Depto.La Libertad	1980	29	0	**Reactive**	La Libertad	La Libertad	Playa del Obispo	**Sea**	
62	Asoc. Coop. Prod. Agrop. El Milagro de Cuaita.	1985	25	0	**Active**	Sonsonate	Caluco	Agua Caliente	**Cont.**	
63	Asoc.Coop. Agropesquera Lago Plateado.	1986	11	5	**Active**	Ahuachapan	Ahuachapan	Llano El Espino	**Cont.**	
64	Asoc.Coop.Prod.Agrop.y Comercialización y Serv.Pesq.Playas Negras.	1992	47	18	**Active**	La Paz	Zacatecoluca	San Jose de la Montaña	**Cont.**	
65	Asoc.Coop.Prod. Pesq.y Servicios El Jocotal.	1993	20	0	**Active**	San Miguel	El Transito	El Borbollon	**Cont.**	
66	Asoc.Coop.Prod.Agropecuaria Sueños Dorados.	1994	24	19	**Active**	San Miguel	El Transito	San Carlos	**Cont.**	
67	Asoc.Coop.Prod.Agrop.y Pesquera Misael Gallardo.	1995	10	5	**Active**	Cuscatlan	Suchitoto	Platanares	**Cont.**	
68	Asoc.Coop.Prod.Agrop.y Pesq. Cerro de Las Campanas.	1995	13	2	**Active**	Usulutan	Nueva Granada	Jicomontique	**Cont.**	
69	Asoc.Coop.Prod. Pesq. Serv. Multiples Estancia Nueva.	1995	16	0	**Active**	Usulutan	Estazuelas		**Cont.**	
70	Asoc.Coop.Prod.Agrop.y Pesq. Milagro de dios No. 2.	1993	39	6	**Active**	Santa Ana	Metapan	Las Piedras	**Cont.**	
71	Asoc.Coop.Prod. Agrop. Pesq. Roberto Menjívar.	1996	19	2	**Active**	Cuscatlan	Suchitoto	El Corozal	**Cont.**	
72	Asoc.Coop.Prod. Agrop.y Pesq.Puerto San Juan.	1996	19	11	**Active**	Cuscatlan	Suchitoto	San Juan	**Cont.**	
73	Asoc.Coop.Prod.Agrop.Pesq. Puerto Flor.	1996	31	5	**Active**	Usulutan	Jucuarán		**Cont.**	
74	Asoc.Coop.Prod. Agrop.y Pesq. Puerto de Joco.	1997	13	2	**Active**	Usulutan	Nueva Granada	Los Guaras	**Cont.**	
75	Asoc.Coop. Prod. Serv. Agrícolas Pesquera AGRIMAR	1997	16	3	**Active**	Chalatenango	Nueva Concepción	Portero Sula	**Cont.**	
76	Asoc. Coop. Prod. Agrop.y Pesq. Cuenca del Pacífico.	1997	15	6	**Active**	La Paz	San Pedro Masahuat		**Cont.**	
77	Asoc. Coop. Prod. Agrop. Pesq. Artesanal Laguna de Apastepeque	1997	13	5	**Active**	San Vicente	Apastepeque		**Cont.**	
78	Asoc.Coop. Prod.y Serv. Pesq. Las Vencedoras de Oriente El	1997	0	15	**Active**	Usulutan	Jucuarán		**Cont.**	
79	Asoc. Coop. Prod. Pesq.y Serv. Multoples Candelaria Lempa.	1999	25	9	**Active**	San Vicente	San Ildefonso	Candelaria Lenpa	**Cont.**	
80	Asoc. Coop. Prod. Pesq. Treinta de Septiembre.	1999	42	3	**Active**	Santa Ana	Comapa	Las Conchas	**Cont.**	
81	Asoc.Coop.Prod.Pesq.Artesan.Las Riveras Lago de Ilop.de R.L.	1981	53	1	**Inactive**	San Salvador	Ilopango		**Cont.**	
82	Asoc.Coop.Pesc.Artesan.La Laguna Metapán	1987	28	1	**Inactive**	Santa Ana	Metapan	Las Piedras	**Cont.**	
83	Asoc.Coop.Prod.Agrop.yPesq.El Desague de Guija	1981	10	7	**Inactive**	Santa Ana	Metapan	Belen Guijat	**Cont.**	
84	Asoc. Coop.Prod. Pesq. Y Agrop. El Tablón.	1981	32	0	**Inactive**	Chalatenango	El Paraiso	El Tablon	**Cont.**	
85	Asoc.Coop.Producción Pesquera La Paz.	1984	31	5	**Inactive**	Usulutan	Estazuelas	Vista Hermosa	**Cont.**	Lempa river
86	Asoc.Coop.Prod.Pesq.Artesanal Suchitlán.	1990	56	10	**Inactive**	Cuscatlan	Suchitoto		**Cont.**	
87	Asoc.Coop.Prod.Pesq.,Ahorro y Crédito Los Mancornados.	1992	20	15	**Active**	Usulutan	P. El Triunfo	Munic. Villa	**Descon.**	
88	Asoc.Coop.Prod.Pesq."3 de Junio"	1994	14	1	**Active**		San Pablo Tacachico	San Isidro Lempa	**Descon.**	
89	Asoc.Coop.Prod.Agrop.y Pesquera La Pintada.	1995	22	1	**Active**	Usulutan		Belen Estanzuela	**Descon.**	
90	Asoc.Coop. San Carlos La Unión de R.L	1981	28	0	**Inactive**	La Unión			**Descon.**	
91	Asoc. Coop. Prod. Pesquera de San Diego.	1981	14	5	**Inactive**	Usulutan			**Descon.**	
92	Federación de Asociaciones Cooperativas de El Salvador.	1985	0	0	**Inactive**	San Salvador			**Descon.**	
93	Asoc.Coop.Prod.Pesq.Mineros del Golfo.	1987	49	17	**Inactive**	La Unión	Cipres Conchagua	Corrales	**Descon.**	
94	Asoc.Coop. Prod.Pesq. Bahía del Pacífico.	1993	22	0	**Inactive**	Usulutan	Usulutan	P. Flor	**Descon.**	
95	Asoc.Coop.Prod.Pesq.y Serv.Multipes El Chapernal.	1993	28	12	**Reactive**		San Alejo	Los Jiotes	**Descon.**	

Source: Department of Agricultural and Livestock Associations of the MAG (except the operation areas that were estimated by the Study Team based on the location. Furthermore, through the field study the Study Team confirmed the operational state of cooperatives.

9.1.2 Reasons for fisheries cooperatives to be inaugurated

The reasons for fisheries cooperatives to be inaugurated are as follows:[4]

- Achievement of fishers autonomy and development
- Turning the activities into industrial fisheries
- Access to international and national assistance
- Improvement of fishing techniques
- Utilization of the portion of the catch from shrimp trawling
- Creation of mutual assistance structure among women
- Social security benefits
- Recovery of "curiles" reserve and achievement of better living standards
- Access to credit
- Profit increase
- Increase of fishers' capacity to express (have a voice)
- Improvement of fishing gear and/or boats
- Better marketing routes
- Acquisition of organizational capacity

All cooperatives have been organized for different reasons, all of them have the common goal to gain access to internal or external assistance in order to achieve their aims or to develop specific activities. This approach is endorsed by the fact that many cooperatives have not had any access to assistance or have used up all the funds that have been granted to them and suspended operations.

As shown in Figure 9-1, the expectations for assistance reflect in the number of cooperatives that have been established. If this figure is combined with the data of the cooperation trend that started in the 80's, some type of relationship between the implementation of the operation and the establishment of cooperatives can be detected. For example, the number of new cooperatives increased when the IDB provided assistance and financing between 1978 to the early 1980s; in 1985, with the implementation of the FAO and PRADEPESCA projects; in 1995 and 1996, with the implementation of the Fisheries grant aid program by Japan; in 1999, during the preliminary study of the present Development Study, etc.

[4] Information obtained from the results of the RRA and interviews (conducted in October and November, 2000).

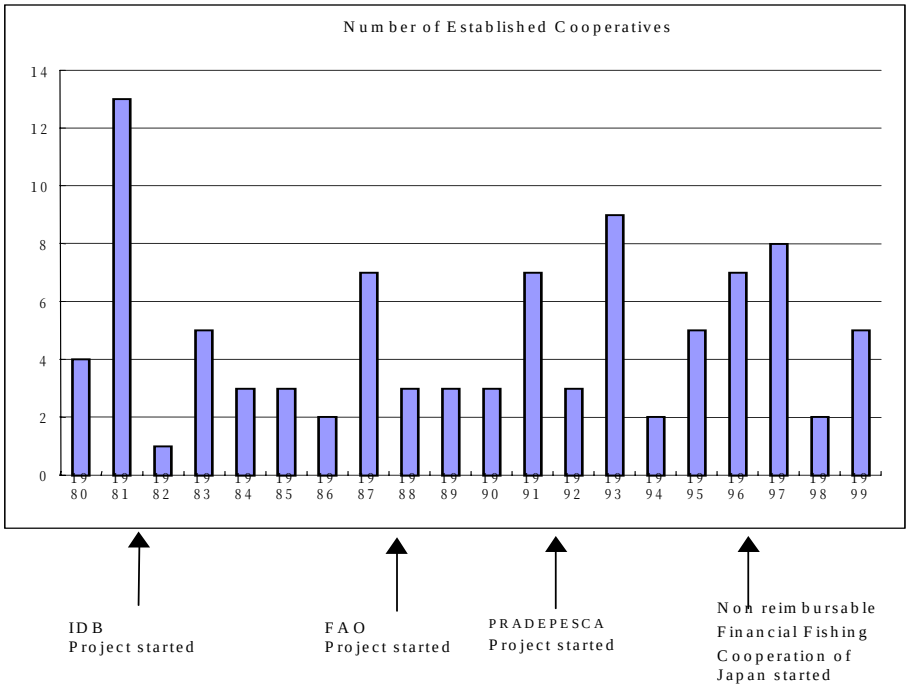

Figure 9-1: Year of Establishment of Fisheries Cooperatives

9.1.3 Administrative Status of the Fisheries Cooperatives

Fisheries cooperatives make their profit from: (1) sale of the catch; (2) fishing boats and gear leasing; and (3) sale of ice and fuel (only those that have ice-making machinery or their own gas stations). Table 9-3 summarizes the conditions for the collection and collective delivery of the catch, boat leasing, ice-making facilities and self-owned gas stations, etc. of the presently operating cooperatives that were object of the RRA.

The main activity carried out by the fisheries cooperatives in El Salvador involves the purchase of the catch made by the members with fishing boats and gear property of the association and then do the marketing. Aside from the profit made from the sale of the catch, the cooperatives receive the product of the fishing boats and gear leasing.

In addition to internal problems, for the cooperatives mentioned below, the decrease in the catch in the last years has translated into an income decrease of the organizations and many of them are facing financial problems. Cooperatives equipped with ice-making machinery and gas

stations make their profit from the sale of ice or fuel.[5] However, the activities of ACOPELI have brought negative results[6] as it declared bankruptcy in January 2002 although this cooperative had ice-making facilities. Within this context, the cooperatives that are not included in Table 9-2 have been practically forced to suspend their operations.

Table 9-2: Operating Status and Cooperative Facilities

Fisheries Cooperatives	Number of members	Associated boats	Collective sale	Leasing collectionde	Ice-making machiery	Freezer	Gas Station	Sale of Fishing Gear de	Other
ACOOPPAC	54	25	Yes	1/3	Yes	Yes	Yes	Yes	No
ACOPP	31	23	Yes	1/3	△	△	Yes	No	No
ACOPELI	58	29	Yes	1/3	Yes	Yes	No	No	No
Mar y Concha	30	5	Yes	1/3	No	No	No	No	No
San Antonio Los Blancos	21	10	△	1/3	No	No	No	No	No
Los Arcones	16	7	Yes	1/3	No	No	No	No	No
Isla Méndez	34	14	Yes	1/3	No	No	No	No	Ferry
Las gaviotas (women's cooperative)	36	9	Yes	1/3	No	No	No	No	Cafeteria
ACOPPESEMPET	20	15	Yes	1/3	Yes	Yes	No	No	No
ACOPARADA	54	23	Yes	1/3	Yes	Yes	Yes	No	Transportation

Source: RRA results and interviews (conducted in October - November, 2000)
Observations:
1) "1/3 of lease collection" means that the distribution method called one-third system was applied. In the case of a boat with two crewmembers, the boat and gear lease, the crew wages (sale – production costs) are divided by 3; 1/3 goes to the shipbuilder (to the cooperative in this case) and 1/3 goes to the two-crew members, respectively. This system is based on the fact that there are two crew members on the boat; if there are three, the distribution is made among four (1/4).
2) The symbol ≥ means that it is not done for any reason although it is in condition to do it.

Below is a brief summary of fishery cooperatives based on the results of the administrative diagnosis in four cooperative from October 2001 until January 2002. The cooperatives that were investigated in this study are: Acajutla, la Libertad, Los Blancos and Parada.

(1) Finances

Many of the cooperatives here studied have debts with banks. The amount varies from 7,000 to 10,000 depending on the organization. Some cooperatives are in debt in one side and in the other, they have loans with their members some of which are uncollectible loans. In particular,

[5] The sale of ice and fuel in the ACOPELI, ACOOP, ACOPPESEMPET and ACOPARADA cooperatives exceeds the sale of the catch. Details are unknown regarding ACOOPPAC due to lack of information (according to the results of the RRA and interviews).
[6] According to the 1997-1999 Balance Sheet and Profit and Loss Statement of ACOPELI.

in the case of ACOPELI, the uncollectible credit of its members reaches 180,000. The financial situation varies in each cooperative. However, two significant causes can be conceived for large loans and uncollectible credit. One is that cooperatives do not keep a record of an account, or do so insufficiently; the other is that they do not count the depreciation of current assets (machinery and materials). This situation is aggravating even further due to a decrease in the catch in the past years that directly effects the administration of cooperatives.

The inadequate management of resources and the lack of accounting knowledge are the principal causes of the administrative problems. The situation is very serious in the cooperatives of Acajutla and La Libertad, as far as for the latter one to declare bankruptcy in January 2002.

(2) Commerce

Until now, cooperatives have tried to look for new clients. However, these sporadic and alienated efforts have failed to establish a permanent commercialization channel. Many of the cooperatives continue to sell their products to small and medium intermediaries, while only few have shown interest in directly participating in the distribution of their products in the market. Only FACOPADES possesses its own collection center, but it is not functioning efficiently.

(3) Production

In the first years of the 80's when many cooperatives were established, fishing operations were very profitable. Some of the cooperatives not only fished but also searched for other sources of income such as the sale of ice and gasoline, renting of refrigerators, eco-tourism, etc. In this period, these activities generated enough income. However, in the present, the production of ice is no longer profitable due to a 40% increase of energy prices in recent years. In addition, since the second half of the 90's fish catch has been reducing.

(4) Human Resources

In many cooperatives, the number of members has been decreasing. Although many cooperative members have participated in various seminars and workshops, the level of awareness as "members" is insufficient. Another cause for the lack of vitality of cooperatives is the delay in generational change.

(5) Planning

In general, only few cooperatives have a clear vision into the future. Members tend to search for immediate interests without projecting into the future. The same could be said of the directors. The degree of development of cooperatives cannot be evaluated since cooperatives lack a clear

goal. One of the reasons for this has been that the periodically elected directors do not focus on giving continuity to the already established plan.

(6) Duties and responsibilities of the members

The duties of the members are those established in the statutes. Members lack consistency to carry out the assigned work and have little sense of responsibility. For example, some members renounce their compromise as members when cooperatives go through economic crisis, or sell their products to the intermediaries without doing through the cooperatives. The interest and willingness of members to participate in collective activities are especially low in some cooperatives.

(7) Quality

Quality consciousness is one aspect that cooperatives have lacked. Behind this situation is the low value-added of the product in the market, even when given an adequate treatment or when maintained fresh (there is not much price difference with products without these treatments).

(8) Utilization of Opportunities

Since cooperatives seek to receive external assistance, great part of their efforts is oriented to seeking this assistance. In fact, the majority of cooperatives have received cooperation from foreign countries, especially Japan.

(9) Information

Although information constitutes an important factor for the development of cooperatives, it had not been taken into account until now. Information not only is use as investment indicators but also it is indispensable to entry or to know a new market. The information on prices supplied by intermediaries, conditions of equipment, financing possibilities, supply costs, etc. are indispensable for the administration of a cooperative.

(10) Risks

Taking a loan should be evaluated by the economic capacity of the cooperative to reimburse. However, many of the cooperatives do not even understand their capacity. Such is the case of La Libertad fishery cooperative, which took excessive loans and had to bear large obligations.

The results of the study show that only few fishery cooperatives have been able to establish themselves as a firm. Until now, organizations used to suspend operations when facing problems and re-started once they could benefit from a cooperation project. This scheme only

increased their degree of dependency on external assistance. It is not difficult to prolong the life of cooperatives through material assistance. However, this will not be sufficient to improve the essential part of cooperative management.

9.1.4 Federation of Artisanal Fishers' Cooperatives of El Salvador (FACOPADES)

The Federation of Artisanal Fishers' Cooperatives of El Salvador (FACOPADES) was founded on May 14, 1993, by ten cooperatives (and obtained its legal status on June 9 of the same year. The motivation for its foundation by then was to collect the harvest and promote exports. This latter activity had caught the attention of the sector as the only way to obtain tax exemption.

After its foundation in 1993, the cooperatives of Tasajera in 1995, Pirrayita in 1997, San Antonio Los Blancos in 1999, Vencedoras and Las Barreñitas in 2000, joined the Federation making a current total of 15 cooperatives. FACOPADES remains cautious towards the affiliation of new organizations and makes through evaluations of candidate cooperatives interested in joining. Furthermore, FACOPADES emphasizes that it is not an institution that rules member cooperatives, but that each of them plays a leading role.

FACOPADES has the following objectives:

(1) Represent the interests of artisanal fishers before the Government in the following issues:

- Request support on tax issues: Until 1985, the Government granted its support to artisanal fishing (tax incentives for the purchase of fuel, tax exemption, etc). However, after that year, these incentives measures disappeared directly affecting the cooperative's administration. This situation led FACOPADES to request the government to restart assistance.
- Artisanal fishers' social welfare: While it is true that FACOPADES is not carrying out any specific activity at present, it is deemed that the incorporation of fishers' social welfare into the new Law is the following task it should carry out.

(2) Promote the organization of artisanal fishers

- FACOPADES intends to promote and support the organization of fishers as the basis for artisanal fishing development. Currently, the Federation provides support to the organization of three cooperatives, Pirrayita, Cóbanos and El Cuco. While it is true that basically FACOPADES remains open to new cooperatives willing to join, it does not accept cooperatives that do not show an intense activity.

(3) Training

- Among fishing communities, it was believed that that “fishers had nothing to learn from schools”. However, education is an important aspect to be considered in the development of cooperatives in the next coming years. Education in the areas of management, accounting, production and processing has become increasingly important. FACOPADES has plans to provide training, and particularly, to incorporate women into the organization.

The organizational structure of FACOPADES is as follows.

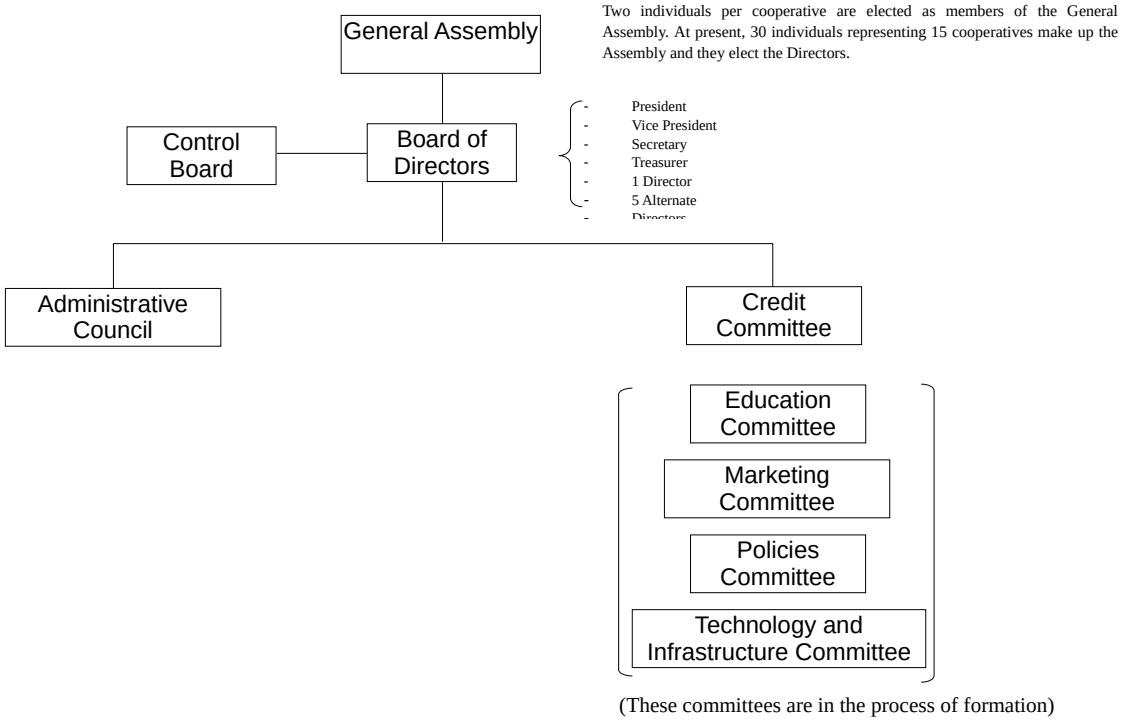

Figure 9-2: FACOPADES Organizational Chart

FACOPADES has the following ideas for their development in the coming years.

- Benefit from the Japanese cooperation (presently under way)

Currently, there are two projects under way within the context of the Grass roots grant aid for Community Projects, one for FAD and artificial reefs and the other for the development of “curiles” (*Anadara spp.)* and “curilillas” *(Anadara similis)* aquaculture. The first is being implemented in the coast of La Libertad and the second in the cooperatives of Barreñitas and Isla de Méndez in Barra de Santiago. Besides, in the year 2002, the product collection center managed by FACOPADES was built in Puerto Parada.

- Exports (under analysis)

The project profitability is under analysis in order to increase exports to Mexico and the U.S. Special priority is given to the U.S. since it is likely that exports to Mexico will not be profitable enough. At present, FACOPADES is not exporting directly but is selling the collected harvest to intermediaries.

- Strengthening the link between intermediaries and fishers (plan)

It is intended to establish a relationship between the officers of the Ministry of Economy and MAG, intermediaries, fishers and other relevant institutions and role players through the organization of artisanal fishing fairs in order to increase trade.

- Official permit to operate gas stations

Once FACOPADES obtains the license to operate gas stations, it will be possible to sell gas to general consumers (at present, many gas stations only can sell gas to members). In addition to the above, the possibility to enter into a direct purchase and sale contract with gas companies is under study in order to buy gas at wholesale market prices.

9.1.5 Cooperative Failures and Success

The relatively successful cooperatives are four: ACOOPPAC, ACOPELI, ACOPO and ACOPARADA.[7] The common denominator of these four cooperatives is that they are equipped with ice making facilities and their own gas station (except ACOPELI) and with the presence of a strong leader. In addition to the donation of ice-making machinery, the three cooperatives, except ACOPO, have obtained financing to expand their facilities in order to increase their profit with the sale of ice. R.L. ACOOPARADA has bought the old salt mine and is examining the possibility of cultivating shrimp through experiment.

The Torola Cooperative was forced to close operations although it is equipped with ice-making facilities. These examples suggest that having the necessary infrastructure is not the promising factor for the success of these organizations. Under the present circumstances where there is little possibility to increase the catch, the key to development is to make an efficient use of the equipment at disposal and look for new opportunities through the sale of services and not necessarily only through fishing itself. In this sense, first is that the leadership and the

[7] According to the results of the interviews conducted in October - November 2000. However, there are only few "successful" fishery cooperatives as is shown in the fact that the La Libertad cooperative went bankrupt and other cooperatives that are facing serious administrative crisis. According to the administrative diagnosis results, of the four cooperatives studied, Parada is in a relative good situation.

administrative capacity of the board of directors, particularly the director of the association, and second the awareness of members as such is an essential factor for the growth of cooperatives.

Regarding the first point, the presence of a strong leader is the most important requirement for the organizational development. However, the Law of Cooperatives states that the director's term of office is four years (one cycle of two years with possibility of reelection, making a total of four years). The more difficult a situation becomes, the more it becomes necessary to have an industrious leader keep on presiding the cooperative management. Even though, the law does not allow it, and this limits the sustainable development of cooperatives.

Therefore, some cooperatives has partially succeeded by building infrastructure that brings non-fishing income and having a good leader. Though having a good leader, it is still difficult for most fisheries cooperatives to improve their situation by themselves. As they are small (10 members or a little more than 20), and their income is limited due to the decrease of the catch in the last years. Moreover, they do not have other equipment or facilities other than fishing boats, engine and gear.

9.1.6 Future Expectations

As it was previously indicated, most fisheries cooperatives are going through administrative crisis due to the reduction of the catch in the last years. This situation will continue in most cooperatives that do not trade with ice or fuel since there is little hope that the coastal resources recover by natural process. It cannot be expected that they make new investments nor that the organization expands and it is very unlikely that cooperatives develop to the extent that they can cover most national artisanal fishers. Furthermore, relatively big cooperatives equipped with gas stations or ice-making facilities are not in good situation, either. Private ice making companies were established in La Libertad and El Triunfo in nearby areas thus affecting the sale of this product by cooperatives. Besides, the demand for ice for the conservation of the catch has experienced a decrease due to a decrease in the catch itself. Regarding the sale of fuel to general consumers, the cooperatives are at disadvantage with private gas stations and there is little hope concerning a further growth of this activity.

Consequently, the situation is extremely critical in terms of future development not only for those cooperatives without the basic infrastructure but also for those that have one.

9.1.7 Other Groups of Fishers

As it was previously mentioned, most artisanal fishers do not belong to any organization. However, there are groups of common fishers in a lower percentage, as follows:

(1) Group of Boat Owner and Crew Fishers

Core fishers such as owner of fishing boats and gear, gather several dozens of fishers to form groups of fishers. An example of this type of group is the San Ramón[8] Association in Maculis (La Unión).

(2) Group of Middleman/Boat Owner and Crew Fishers

This is the case that middleman/boat owner hires fishers for the catch. An middleman can own more than ten boats and the size of the group may also vary to more then ten crew members. Among these groups, there are cases that middlemen purchased boats or fishers purchased boats and later became intermediaries. Molina Rubio Fishery (PESMOLRU)[9] is a representative example of this type of group.

9.2 Problems of the Organization of Fishers

9.2.1 Limitation Factors of the Formation of Fishers Cooperatives

It has been established that the three basic principles for a cooperative are the followings: 1) the right of ownership belongs to the members (users); 2) the control of the organization is exercised by the members; and 3) the profit is distributed among the members. In other words, each member contributes to the resources of the organization and participates in the administration with the right to vote; all members have access to the services of the cooperative and the profit is distributed among all of the members. Additionally, the relevance of a cooperative lies in the development of fair priced and advantageous transactions through coordination among cooperatives, cost reduction through an economy of scale and the use of the coordinating capacity, profit increase, political presence, etc.

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[8] San Ramón Association owns twenty small fishing boats and operates with approximately 60 fishers. The representative of the Association was originally an employed fisher who had not possessed his own boat, but later became a “common boat owner”. He progressively increased his fleet until it reached a maximum of 30 boats. At present, this number was reduced due to decrease of the catch.

[9] Molina Rubio Fishery (PESMOLRU) is an intermediary company of Jaguey (La Paz) hiring approximately twenty artisanal fishers, owning ten boats. When it was established in 1985, it operated with 25 boats but the number decreased in time due to decrease of the catch. Al present, in addition to 10 boats it has subscribed a semi fixed contract with fishers owners of five boats. It has a post of sale in the auction market in San Salvador and most of the catch is commercialized in this sector.

The control premise by the members lies in their active participation in the cooperative management. However, in the case of El Salvador, cooperatives have been established in order to have access to the equipment and materials supplied by the cooperation projects and little priority has been given to the relevance of a cooperative as such. Cooperative members try to defend the acquired rights, that is, to use the fishing boats and gear and receive their retribution. New members are not always welcomed since the increase in the number of partners means a reduction in the rights and interests. Actually, many cooperatives limit the number of direct partners through demanding requirements for the incorporation of new members (high membership fees, specific level of knowledge and expertise, etc). Therefore, an attitude aimed at joining efforts to defend the existence of the cooperative and face the critical situation is not perceived since most of the efforts of the members are focused on defending their own individual interests. Since the Law of Cooperatives guarantees the right of all members to elect their directors[10], they elect their president and directors based on their own individual interests and there is a strong tendency to reject directors that may put their situation at risk, despite the fact that they are indispensable for the existence and development of the cooperative. (See box 9-1).

A cooperative is a system that recognizes the rights of each one of the members. While right is always associated with responsibility, in the case of the Salvadoran cooperatives it is perceived that members only insist on exercising their rights but do not share the responsibility to manage the organization. Then, the most serious problem faced by Salvadoran cooperatives is their system that hinders the self-sustainable development of an organization such as that.

In addition to the above, there is another adverse factor resulting from the legal capacity that these cooperatives have. It is the “low buying price of fish”, which is one of the causes of the stagnation of the volume of product (= low profit). The cause lies in the fact that cooperatives, as juridical organization, are obliged to pay VAT (13%) while middlemen, who are natural persons, are not paying taxes[11] and at least have the possibility to offer a relatively high price without paying VAT.

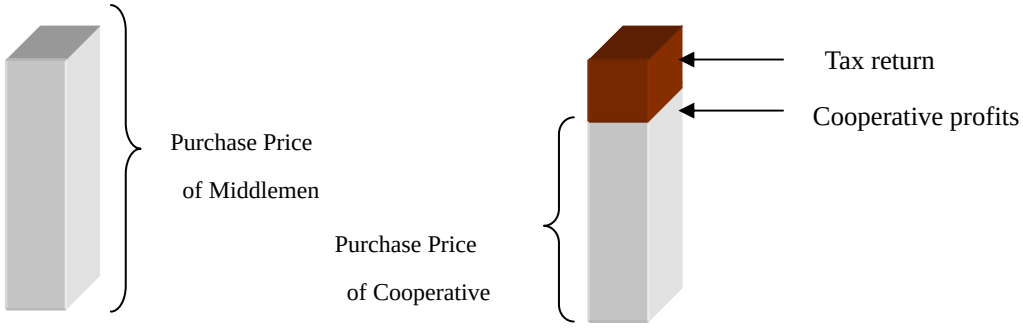
If tax collection from independent entrepreneurs is not enforced, the problem will continue to be a great disadvantage for the establishment of cooperatives with legal capacity. In order to generate an income that compensates for the VAT payment under these circumstances, it is

[10] The Law of Cooperatives of El Salvador stipulates that the members have equal right to vote for the election of directors, regardless of the amount of the contribution.

[11] While the Law provides that middlemen are obliged to pay VAT even if they are natural persons, they do not comply with the law due to lack of a control system.

necessary to implement measures such as the rationalization of the distribution system or attribution of higher added value to the product through processing, etc. Nevertheless, the current capacity of the cooperatives is not sufficient to quickly implement these solutions.

Figure 9-2: Comparisons between Middlemen and Cooperative Purchase Price



Box 9-1.

Interview with the Executive Director of La Libertad Cooperative

The Director stated that he signed a contract for this position. The same as with the other cooperative directors, the executive director is elected by the General Assembly for a 2-year term of office. Members have very strong rights. Since the president is also elected by the members, an excessively demanding president can be removed by the General Assembly. Cooperative members vote based on their own criteria even if the cooperative is going through a critical situation or if there is an income decrease as compared to the results of the previous year.

ACOPELI has had four strong leaders so far. The president is elected by the General Assembly and reelection is allowed only once as the Law of Cooperatives forbids that the same person remains as president for many years and this is why four people have been in that position in tern. Currently, three of the four former presidents have left the cooperative and there is only one leader remaining.

This structure has allowed the organization to keep a coherent administrative policy even though the other members do not know how the administration works (and they did not show interest in doing so, either), thus a gap exists between the management and the members. Cooperative members have a tendency to put their interests above those of the cooperative and the board of directors deems that these members are an “obstacle for the management”.

The catch has been drastically reduced after the earthquakes possibly due to the effects of these events. In view of this situation, the cooperative implemented an exceptional measure that does not agree with the bylaws, which is buying half of the catch and leaving the other half at the disposal of the members. The bylaws establish that members should sell the entire catch to the cooperative but by enforcing this provision, the members preferred to leave the cooperative, so this exceptional measure implemented in order to keep cooperative members in the organization, only during the low catch season.

The cooperative sets more favorable prices than those offered by middlemen in order to increase to the extent possible the volume of product handling. However, even by doing so half of the volume handled involves the catch of non-associated fishers. As of February 28, the buying price of red snapper was ¢14. Since red snapper was to be sold at ¢20 at consumer market, the profit from one pound is ¢3.4 (including VAT). Consequently, if a big volume of product is not handled, the sound operation of the cooperative cannot be maintained and then the cooperative sets a high purchase price in order to gather sufficient amount of product. However, the basic problem is that the members do not provide the total of the catch. On the other hand, the dilemma is that if members are required to bring the total of the catch they would continue selling part of it without reporting the actual catch amount.

The executive director stated that in order to keep his post, he tries to offer to extend possible services in favor of the members since they are entitled to replace him. For example, whenever the director is informed that a member or the relative of a member is ill or injured, he visits the person, either during the day or at night, to offer his help to transfer him to hospital or to take care of his family. Nevertheless, he is well aware of the administrative situation of the organization and knows that if changes were not made, the cooperative would be at risk of disappearing.

9.2.2 Problems due to Lack of Organization

The fisheries cooperatives that are eventually the only fishers organizations in El Salvador, barely gather 3% of all the artisanal fishers and there is low expectation that the rate will increase significantly in the following years. The lack of an organization, not limited to cooperatives, covering all of the fishers is the bottleneck in the promotion of the fisheries sector development. The main problems resulting from this situation are described here below.

(1) Difficulty to Manage Fisheries Resources

There is evidence of the loss of fisheries resources in the shore as well as in estuaries and seawaters. The decrease of the catch is partly due to natural phenomena such as hurricanes, earthquakes or El Niño, the variation of fishing grounds due to earthquakes and by-catch of shrimp trawlers. However, overexploitation of fisheries resources by artisanal fishers has had significant impact on this situation as well. In order to further increase the catch, fishers continue fishing with smaller mesh size nets or using double nets. They also fish with illegal methods such as homemade explosives or poison in some areas of the estuaries. While some deem that this situation is critical a collective and constructive action such as the management of in shore resources at regional level, cannot be started due to lack of organizations.

(2) Lack of Access to Credit Services

Non-associated fishers of El Salvador do not have access to credit services and therefore are not in condition to implement any type of project, which requires a high sum for initial investment. The lack of access to credit limits diversification or forces fishers to fish in the off shore area and therefore, creates an obstacle to fisheries development.

(3) Lack of Access to Public Services and Efficient Technical Assistance

There is barely an efficient technical assistance or advisory on the part of the administrative institutions. One of the causes of this situation is that CENDEPESCA as the responsible entity has not been able to perform its duties due to its weak organization. However, it could be also true that the technical advisory or assistance services have not been successful because most fishers are not organized.

(4) Lack of Power to Negotiate with Shrimp Trawlers

While the coastal resources depletion and the destruction of fishing gear due to the operation of trawlers is a big problem, artisanal fishers lack the necessary countermeasures. This is because complains are sporadic and at an individual level and it has not been possible to organize them

under a fisheries organization.

Chapter 10 Fisheries Statistics

10.1 Current Status of the Statistical System

10.1.1 The role of Fisheries Statistics and its Contents

The itemized statistics of the agricultural, forestry and fisheries sector are managed by the Ministry of Agriculture and Livestock (MAG), and those corresponding to the fishery sector are published by CENDEPESCAs Annual Fisheries Statistics. The data of the fishing statistics in this publication are divided into seven sections: 1) industrial fisheries; 2) marine artisanal fisheries; 3) inland waters artisanal fisheries; 4) fresh water aquaculture; 5) marine aquaculture; 6) Trade; and 7) Fisheries production by department and species. A summary of each section is shown in Table 10-1.

Table 10-1: Content of Annual Fisheries Statistics by type of activities

① Industrial Fisheries
Monthly unloading of shrimp, processed volume; Monthly catch efforts by species (the main species, crustacean); monthly production by species, the volume of production by species and catch efforts compared to the previous year, monthly shrimp production by specie
② Marine Artisanal fishery
Volume and value of monthly production by cooperatives and by species; volume and value of monthly production of non-associated fishers by species
③ Inland waters Artisanal fishery
Volume and value of monthly production by reservoir and lakes and species; volume and value of monthly production by lakes and species.
④ Fresh water Aquaculture
Production of shrimp larvaes; volume and value of monthly production by species;
⑤ Marine Aquaculture
Production of shrimp larvaes; volume and value of monthly production by species;
⑥ Trade
Export volume and value by species and countries; import volume and value by specie and country
⑦ Fishery production by department and species
Volume and value of production of each department by type of activities; total volume and value of production by species in the last 10 years;

Source: Fishery and Aquiculture Statistics 2000

A general explanation of the problem will be given here, while the following section will address the specific problems of fisheries statistics.

Concerning industrial fisheries (for shrimp), inspectors register the unloading according to shrimp species upon disembarking. Processing plants report monthly to the Statistics Department of CENDEPESCA about the processing volume of each boat[1]. Additionally, the

[1] The term processing involves, in this case, only stowage according to size, freezing and packing (presently, there is no activity other than freezing of fresh products).

Statistics Department receives the exports balance report from the Central Bank. In addition, a system obtains different information at each stage from the volume of capture to the volume of exports at each stage. With regard to statistics on fish species other than industrial fishery shrimp, data is obtained depending the reports of the producers or sampling reports prepared by the personnel in charge of gathering statistical data in CENDEPESCA, therefore, the reliability of the data is comparatively lower.

In order to investigate the fisheries statistics in El Salvador, it is also necessary to considered the agricultural statistics that constitutes the majority of the agricultural and fishery sector. For details on the agricultural statistics, refer to "Box 10-1".

10.1.2 CENDEPESCA Statistics Department Services

The services that CENDEPESCA provides with regard to statistics is broadly divided in the following two activities: (1) data gathering by the local office's personnel; and (2) data processing at the Statistic Department. In addition to the data shown in Table 10-1, the handled by the Statistics Department includes; information on boats and registered fishers, the issuing and administration of identity cards of the people working in the fisheries sector.

Table 10-2: Type of Information Managed by the Statistics Department

Variables processed by the Statistics Unit of CENDEPESCA Information managed by the Statistics Unit	Volume managed / year	Number of personnel	Equipment involved
Non associated artisanal fishers (sea fishing sampling)	38,400 forms	1	5 PC's
Non associated artisanal fishers (freshwater fishing through middlemen)	37,440 forms	1	
Cooperatives' purchase invoices	21,600 invoices	1	
Fisheries products import and export data	1,440 reports	1	
Aquaculture (freshwater and sea water)	200 reports	1	
Industrial fisheries	3,600 reports		
Registration of boats (industrial and artisanal)	7,700 boats		

Source: Results of the Study by the Study Team

Table 10-2 summarizes the types of information handled. The information system of the industrial fishing data has been standardized while in the case of the artisanal fisheries there is lack of secondary data of the volume of the catch of non-associated fishers representing 95% of the total. Therefore, except for the data obtained from the middlemen or fisheries cooperatives, the remaining data have to be gathered by the officers through personal visits to the fishing communities and sampling. Due to lack of budget, it is almost impossible to know the unloading volume of all of the 121 fishing communities scattered throughout the country. Consequently, CENDEPESCA estimates the unloading volume with the

implementation of the following procedures. Table 10-3 indicates the data collection system for each zone office.

(1) Sampling (assessed value)
Local officers visit personally 77 selected fishing communities (almost two thirds of the 121 communities) in order to verify the number of boats sailing for fishing during that day, and at the same time, the data of the catch by species is gathered from 10% of these boats. The data gathering is carried out once or twice (days) each month at each point. The volume of the daily catch by species at each sampling point is estimated as the product of the average volume of the catch (calculated by dividing the total volume of the catch by the number of sampled boats) and the total number of boats. Then, this total is multiplied by 22 days (fixed number of working days by month) in order to obtain the monthly total volume of the catch at each point.

(2) Information Provided by Middlemen (actual measurement)
For those communities that cannot be sampled due to budget and personnel constraints, the data of the purchase invoices are requested from the middlemen in order to obtain the unloading data. The statistical data on the catch tend to be much inferior to the real catch since all the required data is not collected because some disembarkation areas are located far away from zonal offices.

For example, in El Salvador the rate of utilization of the portion of the catch from shrimp boats is high. However, the data on by-catch of the principal disembarkation areas that are located far from local offices are not collected thoroughly because in many cases the cost per trip is not paid to the data collection staff. For this reason the statistical data is extremely lower than the real amount and it is estimated that it represents 10% to 20% of the real landing.

Table 10-3: Data Gathering System

Zonal offices	Number of communities subject to data gathering	Individuals	Data gathering method	Means of transportation
Acajutla	13	4	Sampling	1 FRP boat (outboard motor), 1 vehicle and 1 motorcycle
La Libertad	17	2	Sampling	1 FRP boat (outboard motor), 1 vehicle and 1 motorcycle
El Triunfo	25	4	Through Middlemen	4 FRP boat (outboard motor), 1 vehicles and 2 motorcycles
La Herradura	11	1	Through Middlemen	1 FRP boat (outboard motor), 1 vehicle and 1 motorcycle
La Unión	11	5	Through Middlemen	2 FRP boats (outboard motor), 1 vehicle and 1 motorcycle

The data collected at disembarkation are sent monthly from the zonal offices to the Statistics Department. Regarding the statistical data of other types of activities, the Statistics Department compiles information from reports from firms or public export/import institutions. In addition to the statistical data, the Statistical Department manages the registration data on fishing boats, fishers and intermediaries. In 1998, CENDEPESCA conducted a fisheries census in a great scale for administrative use, which data has not been updated in recent years.

10.1.3 International Cooperation for Fisheries Statistics

To this date, the European Union has extended its technical assistances to fisheries statistics in two opportunities through PRADEPESCA. This cooperation aimed at the introduction of the unified fisheries statistics system in the Central American region. Concerning these projects, the current statistics problems in El Salvador and the issues related to the improvement plan are presented below.

(1) Design of the Unified Fisheries Statistics System in Central America

Consulting services were provided by German consultants in six countries including Panama, during six weeks starting in September 1991. This project mainly involved a diagnosis of the current status with particular attention to artisanal fisheries, and based on these results, the system was designed. The report comprises an analysis of the current situation, recommendations and implementation guidelines summarized below.

Analysis of the Current Status

① In general terms, the reliability of the fisheries statistical data of the Central American region is low. This is mainly due to the absolute lack of personnel and budget required to gather data in view of the volume of the catch, and work plan was made without considering these constraints.

② It has been observed that the most efficient data gathering system is the system through middlemen adopted in Costa Rica.

③ It is likely that fisheries products middlemen and exporters do not provide real data in order to avoid paying more taxes. Therefore, it is necessary that CENDEPESCA officers take samples in the unloading areas to verify the accuracy of the data provided.

④ The information received lacks data on the fishing efforts, fishing methods, type of boat, etc. required for fisheries management.

Recommendations

① The design of the new statistical system should be based on the reality, taking into account the various constraint factors.

② It is necessary to ensure the maximum data coverage to make them more useful.

③ Data gathering should be made by implementing common concepts for industrial, artisanal fisheries and aquaculture.

④ The gathered data should be classified in the following categories. The first category will include the volume of the catch by species, the number of operating boats, the number of each boat's departures and other factors in catch effort. The second will contain the type of fishing boats, fishing methods, fishing grounds, prices and other economic factors. The third will include the composition of the fish size by species, maturity, composition, and other biological factors.

⑤ It is necessary to estimate the volume of the catch with a statistically significant level[2] (in this case, it is of utmost importance to know the number of fishing boats of each community). Assuming an estimate error of the average unloading volume for each boat departure of 10% or less and the average of the monthly departures of each boat, an error of 20% or less is deemed significant.

Considerations on the Implementation[3]

① The required materials and equipment are computers, transportation means and data processing software.

② Based on the results of the pilot project for statistics improvement carried out in Panama, the sampling should be made for at least 80 boats per month.

③ If the data provided by middlemen are altered for the above-mentioned reason (taxes payment), it is necessary to make them assure that such data will not be used to collect taxes but that they are important to make an adequate resources management. Additionally, the data should be directly gathered by CENDEPESCA officers.

(2) Technical Cooperation for the Data Management Software

The statistical data management software for shrimp trawling implemented in the Caribbean Sea by Honduras, Nicaragua and Panama, designed with "ACCESS", was developed in 1996. Such software includes data on fishing boat specifications, catch effort volume, production volume, and biological data, such as size, maturity, etc. Seminars on how to use the software were organized in July 1997, in the entire Central American region. However, this software was no longer used in the different countries due to lack of data input tools and data management modules. In view of this situation, in June 1999, a French consultant was sent for two weeks to El Salvador to identify the causes and prepare the necessary conditions to use the software. His report is summarized as follows.

[2] Estimated unloading volume = (Monthly average unloading by each departure) x (average monthly departure by each boat).

[3] This item is preceded by the statement that "the most significant aspect is that the institution responsible for the management of fisheries statistical data should be willing to implement the following considerations".

Analysis of Current Status

① The data transferred from local offices was not verified before input to the computer.
② Too much time is required to enter the data.
③ Lack of automatic verification system of the data.
④ The software consists in processing Excel data and only provides the monthly unloading volume by company, but cannot make a diagnosis of resources.
⑤ The data of fishing boat license is not entered in the database.

Works Carried Out in the Field

① The form for the shrimp processing volume by species and size in processing plants was prepared.
② Shrimp trawling unloading data were processed by an "ACCESS" program.

Technical assistance in this field has been provided through PRADEPESCA to the staff of the Information Unit/ CENDEPESCA's Statistics. However, the newly recommended system or the implemented program has not been utilized to the fullest perhaps because it was not adapted to the technical capacity of the recipient institution.

Box 10-1

Agricultural Statistics

In spite of the fact that light industry products increasingly represent the Salvadoran GDP, the farming sector continues to be in an important position. In accordance with the annual statistics report prepared by the Statistics and Computing Department of MAG, agricultural statistics are divided into the following five big groups, as follows:① farming products, ② livestock, ③ farming production, ④ foreign trade and ⑤ farming companies. The following table provides a brief summary of each group.

Table 10-4: Fishing statistics per item and content

① Farming products
Yield per unit, sowing area and harvest of the main crops (corn, beans, rice and sugar cane)
② Livestock
Volume of livestock production (beef cattle, poultry and pigs) and the production per department
③ Farming production
Total farming production (cereals, corn, beans and rice), livestock (beef cattle, poultry and pigs) and fishing
④ Foreign trade
Coffee export volume per country, volume and total exports of the main cereals, milk and livestock products
⑤ Farming Companies
Total volume of raw materials used by the domestic companies and total production of raw materials of the domestic companies.

In order to obtain the estimated volume of the farming production, samples of the cultivated areas of the main crops are selected and data of the crop per surface unit are taken. Then the data obtained are multiplied by the total cultivated area and thus the domestic production of the main crops is obtained. A total of 900 samples are selected throughout the country but due to lack of personnel and budget, only real data from 400 or 500 samples are taken. MAG does not have offices in each zone such as CENDESESPA and 24 officers (with university degree) from the main office have to travel to the interior of the country in order to gather the data. These officers are also in charge of making the study of the wholesale and retail prices of the main crops in the public market. Therefore, the lack of personnel is worse than in the case of CENDEPESCA. In this sense, the

agricultural statistics experience the same difficulties as the fishing statistics.

Several technical cooperation projects have been implemented in the past by international organizations but not all the recommendations made were suitable to the institutional capacity of MAG. For example, one of the systems proposed consisted in estimating the sowing area of the crops of the entire country by using the photos taken by the NOAA Satellite and determining the yield of the results of the study by "sampling grid". This system worked in the first years of implementation but it did not work after the project was concluded because the budget was not enough to obtain the necessary photos from the satellite in order to update the data. For this reason, it was necessary to use again the original data processing method that was used before the implementation of the Project. The equipment of the system is not currently used.

MAG has plans to build the National Statistics Center that would be in charge of integrating the different statistical data of the country. Fishing statistics tend to be less appreciated as compared to farming data due to the importance the latter have in the GDP. While farming statistics manage almost the same items for each geographic zone, the fishing data require a continuous sampling in fixed points since the catch (excepting aquaculture) varies daily depending on the place and season due to the ecological characteristics of the species. In order to obtain the same degree of accuracy in farming and fishing, it is necessary to invest relatively higher budget and more personnel in fishing statistics.

10.2 Analysis of the Problems

Based on the present study, it can be summarized that the problems of the fishery statistics in El Salvador are the large margin of error of the statistical data and the delay in output due to the low degree of efficiency of the system of data collection and processing. The data on the volume of unloading of marine artisanal fishing of non-associate fishers that represents the majority (50%) of the national total disembarkation are the ones most affected by these problems. The main factors of this situation are analyzed below.

(1) Problems with unloading data of marine artisanal fishing from the statistical point of view

The number of sample boats and the frequency of the data collection (number of days) in each sampling point are extremely low[4] due to personnel and budget constraints. Another problem is to have set the number of working days in 22 without taking in consideration of local characteristics. Consequently, due to the way that data was collected ignoring the characteristics of marine artisanal fishing unloading figures shows a high margin of error. It should be recalled that the monthly departure frequency of the boats varies according to the condition of the waves, even in the fishing communities of the beaches; and therefore, it is not convenient to use a fixed number of working days by month (22) for all the communities. [5] Furthermore, data management is not consistent because, in some

[4] The local offices of CENDEPESCA have a team of inspectors, guardians and statistical data collectors. However, these positions are executed by the same individuals in the practice. Besides, since the officers of the local offices are under the direct control of the Fisheries Management Unit of the headquarters, higher priority is given to surveillance. This is one of the causes to make the data collection difficult to continue.

[5] The number of fishing boats departures logically depends on the condition of the sea. Nevertheless, even when the conditions of the fishing ground are the ideal, boats cannot sail to the sea if they cannot cross the breakwater zones. These conditions may vary according to the season (rainy and dry), local conditions (depth of the coast), and port facilities. Therefore, the number of departures varies even within the same season.

communities where the sampling survey is not carried out, the volume of fish landing is calculated by using the data of actual performance in the previous years.

CENDESPESCA tries to complement the data collected by its staff with information of the actual unloading (specially the portion of the catch offered by intermediaries). Even in this case, the geographical coverage of the collected data is limited and the estimation will be much lower than the actual catch.

The statistical data of CENDEPESCA on the marine artisanal fishery are not very reliable due to the high margin of error and because not all the data of the main disembarkation locations are included. The problem lies in trying to improve the statistics by increasing the sampling points without taking into account the constraints on the availability of resources in all aspects such as human resources, budget and equipment (transportation means). As a result, the data presents more a greater margin of error. To improve the reliability of the data to a level high enough for it to be used in the management of resources, it is necessary to collect data at fix points on the distribution percentage of the species caught and the frequency of operations of the fishing boats in a constantly and continuous manner.

(2) Problems of Previous Technical Cooperation Projects

The results of technical cooperation projects to improve the statistical system mainly extended by the EU have not been sufficiently disseminated not only in El Salvador but also in other countries of the region. By analyzing the causes of this situation through the revision of previous reports and interviews with the personnel responsible for the statistics, it was concluded that this is due to the fact that the developed program did not take sufficiently into account the socioeconomic conditions of the recipient countries.

For example, the program covers a great amount of variables since it has been designed to implement fisheries with a focus on resources conservation. Even though the initial intention was to develop a functional system taking into account the present structure of the Statistics Unit (budget, personnel, etc.), it established the data error should be 10% or less. This is determined on the assumption that the number of personnel to collect the data to be increased and has been difficult to comply with available budget of the recipient countries. Furthermore, the software designed with ACCESS (database) is only focused on shrimp trawling with data already available, while artisanal fisheries that is more complex, has not been given any consideration. In fact, the consulting team sent in 1990 was mainly focused on artisanal fisheries, but the team sent in 1998 was focused only on shrimp trawling.

(3) Problems of the collection system of the Statistic Data

Figure 10.1 shows the system flow that comprises from fisheries statistic data collection to the publication of the annual report. The shaded part represents where delay is occurring in the current system. There are two main reasons for this delay:

① The utilization of numerous formats for data collection which are not adequately classified.

② The utilization of different formats in the data base according to the type of activities which translate into a complex data processing and thus lowering efficiency. The staff in charge of statistics dedicates a high amount of work time for data input[6].

In addition to above mentioned reasons, there are few more problems such as the lack of awareness of the importance of fishery statistics by the statistic staff, the lack of a clear division of work responsibilities which makes difficult the identification of where the delay of data processing occurs and other systems. Therefore, it is necessary to re-examine the entire system, identify the possible causes for the delay, in this way correct it, and improve it.

[6] They spend six hours a day to input data on non-associated artisanal fishers.

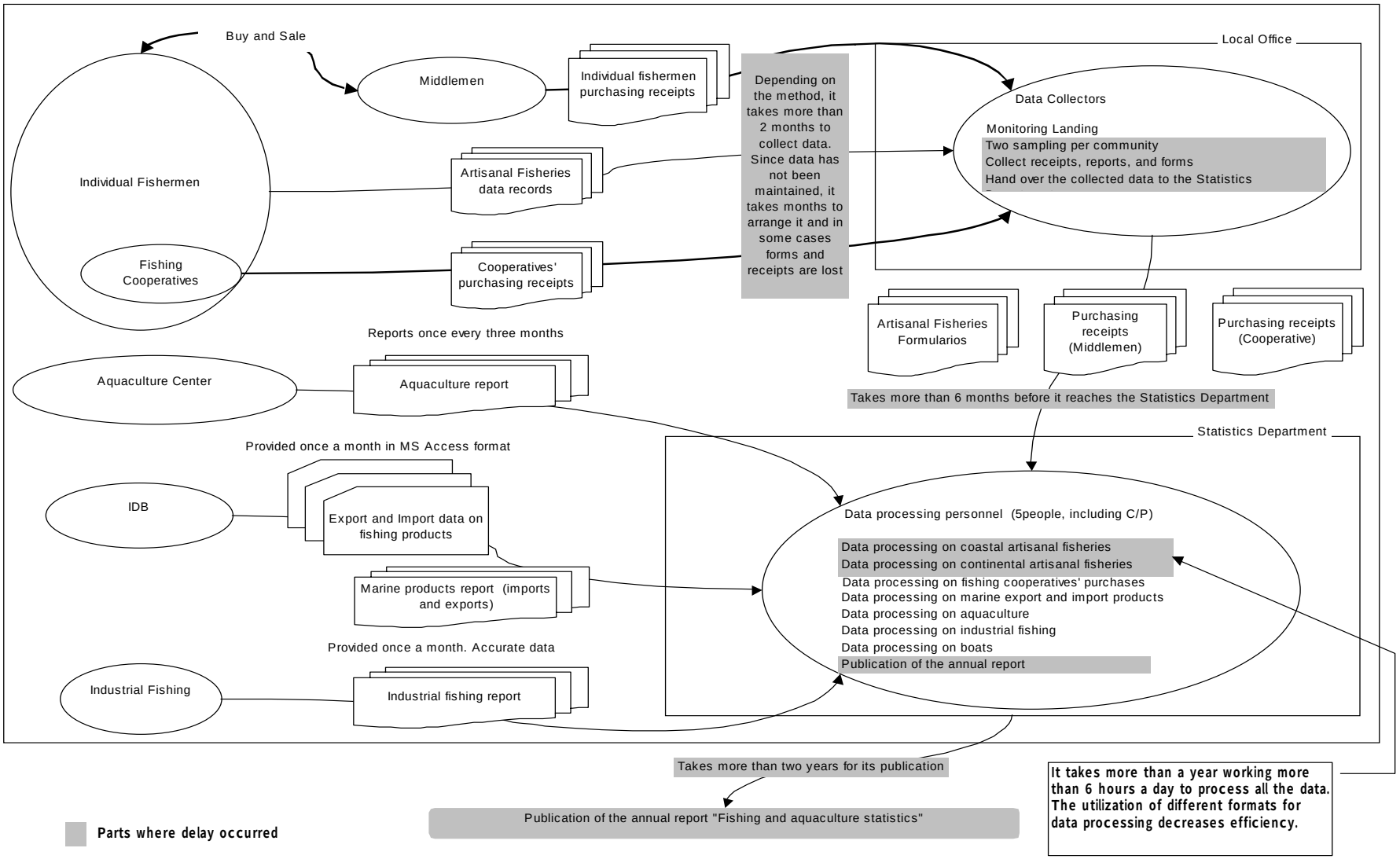


Figure 10-1: Schematization of the system flow of El Salvador's fishery statistics

Chapter 11 Environment

11.1 Current Environmental Status associated with Artisanal Fisheries

11.1.1 Mangroves

(1) Mangrove Distribution

The main mangrove species identified in El Salvador are: mangrove (*Rhizophora mangle*), two species of Avicennia (*Avicennia nitida*, *Avicennia bicolor*) and other two species (*Laguncuria racemosa*, *Conocarpus erectus*). Table 11-1 shows the mangrove swamp surface by region based on the data available though the reliability of the data cannot be verified since little study has been made so far about the distribution of mangrove swamps. The rate of reduction between 1974 and 1989 is estimated to be 22% in all the country. By breaking it down by region, it is observed that the loss is very accelerated in Barra de Santiago and El Tamarindo. According to the study of the National Geographic Institute (NGI) made in 1989, 58.4% of the 45,866.8 hectares of the mangrove swamp area is covered by mangroves, 2.4% by salt works, 16.6% has been converted into agricultural and grazing land, and 22.4% in housing development areas, roads, etc. Mangrove swamps inventories were made until the eighties; nevertheless, studies have been done sporadically and in some specific areas since then and therefore the data are not complete.

(2) Use of Mangrove Resources

Until now, mangroves have been used in the country mainly as a source of energy (firewood and charcoal), construction material, fuel for salt processing or brick manufacture, or the area has been converted into salt works or aquaculture farms, housing development or tourist areas. Besides, the sedimentary clayey soil of mangrove swamps is being used as construction material for the walls of aquaculture ponds. Furthermore, it is said that the agrochemical products used in the past in cotton fields contaminated the water indirectly affecting mangrove swamps.

Illegal mangrove chopping for firewood and exploitation for housing development purposes can be observed throughout the country. Nevertheless, the conversion of mangrove swamps into salt works and aquaculture ponds is predominant in the Fonseca and Jiquilisco bays, while the construction of tourist infrastructures is an important reason for the exploitation of mangrove swamps in Jiquilisco Bay, La Herradura and San Diego. The conversion of these woods into farming land, housing developments, salt works and shrimp farms as well as the extraction of clay have been strictly forbidden, even though there is some problems in institutional control over these activities. Therefore, it is deemed that the impact of these actions is relatively low (Leonard, 1987). It seems that the main threat is mangrove chopping for construction material, firewood and coal for selling purposes or to be used as fuel in the manufacture of bricks and the preparation of salt. It is estimated that in 1983 approximately 30,000m^2 of mangroves were

chopped. Concerning the extraction of firewood and wood coal, this is done for self-sufficiency and commercial purposes and the impact is higher regarding commercial wood chopping.

(3) Mangrove Swamp Management System

Mangrove swamp management is within the jurisdiction of the Forestry Service of the Renewable Natural Resources Division of MAG, with the only exception of Barra de Santiago, where the National Park and Wildlife Service of MAG (PANAVIS) local office keeps control since it is a protected area.

El Salvador enacted the Forestry Law in 1973 that governs the management of forests. Being aware of the ecological importance of mangrove swamps, the Central Government has classified these forests as State resources, and intended to take the pertinent legal and administrative measures to preserve and expand these forests. On the other hand, MAG published a ministerial decree in 1994 to basically prohibit wood chopping in all mangrove swamps, except in Barra de Santiago. Mangrove chopping is only allowed with the authorization of the Forestry Service by Decree, although permits are not granted in most cases. According to the guidelines, mangrove areas cannot be converted into salt works or shrimp farms. Nevertheless, the penalties set forth in the law are not strictly applied. Illegal tree chopping control is kept by the Forestry Service, PANAVIS, Civil Police and the Naval Force, but only three captures have been reported in the year 2000. On the other hand, it should be brought to the attention that CENDEPESCA is one of the authorized entities to control the use of mangrove swamps for aquaculture or salt works according to the Regulations for the Establishment of Salt works and Exploitation of Salt Forests for Marine Aquaculture (1986).

Only one of the 48 Forestry Service local offices, La Herradura (7 officers), is located on the coast, however, it does not have the basic surveillance equipment such as boats and is not in condition to perform forestry management activities. Even though the Forestry Service is aware of the importance of mangrove swamp management, there is little interest and therefore very small budget is allocated for this purpose.

(4) Reforestation Activities

Reforestation in El Salvador is mainly carried out by the NGOs, and the reforested surface in all the projects is very limited. With the only exception of the natural reserve of Barra de Santiago where the reforestation of about 2,000 ha. was carried out with PANAVIS support and with the participation of the local community in order to recover the mangrove areas destroyed by a hurricane in 1992. Furthermore, permits have to be obtained for the commercial extraction of wood and coal and construction materials from this Natural Park and users are obliged to reforest all exploited areas.

Table 11-1: Mangrove Swamp Area Variation

Region	1950	1974	Mangrove Swamp Area (1973-1975) (a)	1989 (b)	% in 1989	Real mangrove area in mangrove swamp areas (b/a*100) (%)	Variation of mangrove swamp area between 1974 and 1989 (%)
Garita Palmera (Ahuachapán)	-	148.0	1,952.55 (Ahuachapán)	136.0	0.51	91.57	-8.11
Barra de Santiago and Metalio (Ahuachapán)	-	2,640.0		1,652.0	6.17		-37.42
Sonsonate	-	-	1,182.55 (Sonsonate)	-	-	-	-
San Diego (La Libertad)	-	260.0	296.69 (La Libertad)	210.0	0.78	70.78	-19.23
Estero de Jaltepeque (La Paz)	-	5,720.0	6,994.18 (La Paz)	5,815.2	21.72	83.14	1.66
San Vicente	-	-	810.23 (San Vicente)	-	-	-	-
Bahía de Jiquilisco (Usulután)	-	1,9847.0	20,097.96 (Usulután)	14,267.0	53.29	73.68	-28.12
San Miguel	-	-	3254.14 (San Miguel)	-	-	-	-
Estero El Tamarindo (La Unión)	-	896.4	10,695.17 (La Unión)	542.0	2.02	38.80	-39.54
Bahía de La Unión (La Unión)	-	4,912.8		4,150.0	15.50		-15.53
Total	100,000.0	34,424.2	45,283.47	26,772.2	100.00	59.12	-22.23

a: The data of 1989 were used for the calculation under the assumption that there has not been a great variation between the 1973-1975 and 1989 periods in terms of the area classified as coastal forests.
Source: "The ecological situation of El Salvador in fugures (La situación ecológica de El Salvador en cifras), Roberto Rubio, Anne Germain, Roberto Góchez, UCA, 1996.
Coastal forest area by province: Contamination levels in El Salvador from the 30's to the 90's (Niveles de contaminación en El Salvador de los años '30 a los '90), Instituto Tecnológico Centroamericano (ITCA), Mechanical Engineering Department, 1994.

11.1.2 Natural Reserves

PANAVIS manages the 24 priority areas of the country. Of these areas, three are National Parks and the rest are natural reserves. Many of the priority areas are small and are scattered in all the country. Different authorities intervene in the nature protection administrative system according to the object to be protected. For example, protected area mangroves are the competence of the Forestry Service of MAG, terrestrial flora and fauna of PANAVIS and the aquatic flora and fauna of the Fisheries Development Center. NGOs also intervene intensively in the management of protected areas and PANAVIS hires the services of NGOs to provide technical and administrative assistance. It seems that a few NGOs monopolize this labor in each region. The only protected area on the coast is the Wildlife Shelter of Barra de Santiago (2,725 hectares).

In October 2001, the Ministry of the Environment presented a request to include the area between Barra de Santiago and Bola de Monte as a protected area in the Ramsar Convention[1].

[1] The convention of Ramsar is an agreement concerning internationally important swamplands, that once a

This action comes from the concern on the destruction of the ecosystem in the estuary zone. This ecosystem includes not only the mangroves of the estuary but it covers a 10,000 ha extension including rivers, canals, coasts and seas of up to 6m in depth. Once the request is accepted, the zone is designated as protected area and users have the duty to conserve and bring back the environment in the estuary and utilize the biological resources in a sustainable manner.

At the moment, the estuary is not only exposed to environmental problems caused by deforestation of mangroves, contamination by agrochemicals and sewage but the interruption of water circulation due to the initiation of upstream irrigation of the estuary cutting the flow of water is a significant problem. The Garita Palmera estuary in particular, it is almost dead since it has lost the function of regeneration of water resources.

11.1.3 Marine Turtles

The marine turtle species identified in El Salvador are four: gulf turtle (*Lepidochelys olivacea*), hawksbill turtle (*Eretmochelys imbricata*; tortoga de carey), leatherback turtle (*Dermochelys coriacea*; tortoga baul), and black turtle "prieta" (*Chelonia agassizi*; tortoga prieta). It has been verified that the first two spawn on the Salvadoran coast and they find their food in the area comprised between the reefs and mangrove swamps. However, very few ecological studies of marine turtles in El Salvador have been carried out so far and the population by species, the number of eggs spawned per year and other details are unknown.

Turtle egg collection and by-catch of fishing boats seem to be the main reason for the reduction of the marine turtle population. Nevertheless, turtles are not fished for consumption. The mandatory use of TED (turtle excluding device or turtle escape door) in fishing boats was ruled in 1996 as one turtle conservation measure. The inspectors and the Naval Force are conducting joint inspections in ports as well as in the sea and infringements were not detected in the year 2000. Egg protection is competence of PANAVIS even though substantial control has not been kept yet. The Marine Turtle Protection Committee that consisted the representatives of CENDEPESCA, Ministry of Environment, Naval Force, the Environment Division of the National Police and NGOs, and coordinated by PANAVIS, was established with a limited budget and does not include community members.

At present, there are nine hatchery centers in the country: two in Barra de Santiago, three in Acajutla and La Libertad, two in Usulután and two in La Unión. These sites are managed by the corresponding community either on an individual basis or with the assistance of NGOs or the Naval Force. Fishers are authorized to commercialize the eggs on the condition that they conserve one or two-dozen eggs to the incubation centers. The objective of this system is to

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location is designated by the Ramsar agreement, its an obligation to protect the swamplands and lagoons.

control egg overexploitation and sale although in the practice it does not work as expected. The possibility to establish the egg collection closed season and restricted area is under consideration.

11.1.4 Water Contamination

The problem of coastal area contamination in the country has been in concern mainly due to agrochemical waste used in the high basin, heavy metals contained by the industrial liquid effluents, and domestic wastewater. Several studies have been executed in the past. The present study contains the analysis of the impact of contamination on the fisheries sector based on these reports and a water analysis conducted during this study.

(1) Contamination by Agrochemical Products

Presently, the import, sale and use of highly toxic as well as slow decomposing pesticides such as aldrin, endrin, dieldrin, DDT, etc., are prohibited in El Salvador. The following table shows the results of the studies carried out in the past on residual agrochemical products though only fragmentary data are available. The report of the study conducted by PRADEPESCA in 1992 found a high concentration of residual agrochemical products in the Jiquilisco Bay in 1975. In comparison to the results of present study, concentrations of aldrin and heptachlorine epoxy were found in the ground and water suggesting that these products are still being used although their impact on the marine resources has not reached a critical level. In general, the degree of contamination as compared to 1975 seems to have improved substantially. Nevertheless, aldrin and heptachlorine epoxy concentrations were detected in the ground of all the study area and dieldrin in mollusks. The accumulated concentration in ark shells (*Anadara spp.)* was particularly high in La Unión and Jaltepeque Estuary, thus requiring continuous monitoring.

(2) Contamination by Heavy Metals

Contamination by heavy metals discharged by mining and industrial areas in Acajutla, La Unión and La Libertad, among others, has become one of the main concerns in the country. However, the sporadic studies conducted so far establish that the water, ground and marine resources contamination level is within the margin of tolerance and it is then of no concern. Concentrations of aluminum, arsenic, copper and mercury were detected in all the points of study though all has been due to natural existence. Nevertheless, some variables have reached a level requiring continuous monitoring notwithstanding the fact that they have not exceeded the WHO standards. These elements are: mercury in La Libertad, and aluminum, arsenic and copper in La Unión. Accumulated concentrations of aluminum and arsenic in *Pteria spp.* in La Unión are extremely high as compared to the concentrations found in the water and bottom ground and it is then necessary to make a new analysis. However, according to local fishers, the *Pteria spp.* mollusks used in the analysis were collected in Honduran beaches and then brought to La Unión. This could be the reason of the big difference in concentration when making the comparison

between water and bottom ground. Anyhow, depending on the results of the new analysis it might be necessary to prohibit the use of these mollusks. In this event, actions should be taken not as merely environmental preservation measures but as food control measures in unloading areas or markets.

(3) Water Quality Monitoring System

PANAVIS carries out a periodical monitoring (twice a year) of the quality of continental water. Nevertheless, the periodical monitoring of the coastal strips contamination is not presently carried out.

11.2 Environmental Contamination in Artisanal Fisheries Development

11.2.1 Environmental Impact Preliminary Evaluation

Table 11-2 summarizes the characteristics of the coasts of El Salvador.

Table 11-2: Characteristics El Salvador's beaches and coasts

Classification	Area to which they correspond	Characteristics
Open sand beaches	Garita Palmera – Acajutla, Los Cobanos – Ayacachapa, Libertad – east of Jiquilisco Bay, Icacal-Maculís	- Sand beach facing open sea. - Most marine turtle spawning sites are distributed here
Cliff beaches	Acajutla、 Ayacachapa – Libertad	- Precipices and small sand beaches
Estuaries	Barra de Santiago, Jaltepeque, Jiquilisco Bay	- Estuaries enclosed by sandbanks. - Mostly covered by mangroves; habitat of shrimp and fish larvae - Habitat of endangered species including the crocodile of America. - It has been detected that mollusk reserves are exposed to an accelerated reduction since their collection by fishers does not need any investment on their part.
Semi enclosed bodies of water	Bay of Fonseca	- Semi-enclosed body of water with weak currents. Susceptible to water euthrofication and contamination due to easy sedimentation of sand and contaminant matters. - Mangrove swamps are distributed north of the bay; their resources have a tendency to decrease due to conversion of mangrove areas into saltworks and shrimp farms.
Island beaches	Zacatillo Island, Conchagüa Island, Meanguera del Golfo Island	- Diverse landscaping with sandy beaches and precipices though all of them are subject to tourist development.

The following environmental impact issues will considered in the small scale development planning taking into account the previously described environmental features.

(1) Mangrove Resources Conservation where Wood is used as a Source of Energy

Mangrove swamps are the most important source of energy for the inhabitants of the coastal strips. The artisanal fisheries development plan formulated within the framework of the present Study proposes the development of the processing of fisheries products in order to achieve fisheries diversification, to contribute to women's participation in the household income and to extend fish consumption. It is still necessary to solve the problem of how to obtain the fuel. In the case of industrial processing plants, it would be necessary to use alternative fuels such as oil or gas. However, in the case of processing plants run by families (artisanal fishers), it would be difficult to look for another source of energy other than materials extracted from mangrove swamps. Therefore, parallel to the development of the processing industry, it is necessary to promote mangrove swamp reforestation and provide assistance for the extraction of firewood and wood coal from the plantations.

(2) Impact on Marine Turtles

Marine turtle egg collection is the seasonal income source of artisanal fishers since it is easy and has demand in the national market. For this reason, it is believed that the egg collection will continue even if the fishers' income increases. In other words, the development of fishing communities may destroy the existing spawning sites. According to the existing reports, in addition to the direct impact caused by the construction of inland fisheries facilities, the possible impact on the displacement of newly born turtles which could be attracted by the lights of the fishing communities near the beaches should also be considered. Consequently, the environmental impact of each type of fishing community should be evaluated since marine turtles spawn in almost all of the open sand beaches of the country.

(3) Emission to Enclosed Bodies of Water

Water contamination caused by artisanal fisheries development may include contamination by liquid effluents emitted by the processing plants (*eutrophication*) and by the liquid effluents emitted during the fishing boat washing and repair process (oil and heavy metals), even though its magnitude would be limited. Nevertheless, it is necessary to take the pertinent measures for enclosed bodies of water such as estuaries and fishing ports, depending on the magnitude of the process. These measures include the installation of simple wastewater treatment plants and adequate disposal of solid waste.

(4) Aquatic Species Contamination Monitoring

Concerning fisheries product contamination by heavy metals and agrochemical products, a more accurate study has to be conducted of the arsenic found in *Pteria spp.* and contamination by aluminum in La Unión. With regard to the rest of variables, it is deemed that their level does not require short-term measures, yet. In any case, great care should be given to the contamination by heavy metals in urbanized areas such as Acajutla, La Unión, La Libertad, etc. as well as to the

contamination by agrochemical products in the Jaltepeque Estuary and La Unión, as a minimum. A monitoring of marine product contamination will be conducted at least twice a year (rainy season and dry season).

Chapter 12 Organizational Adjustment of CENDEPESCA

12.1 Background and Current Status of the Organizational Adjustment

12.1.1 Objectives and Basic Strategies

Starting in 2000, MAG promoted the Organizational Adjustment throughout the institution. However, as compared to other departments, the process in CENDEPESCA has been very slow and the adjustment at full scale just started in January 2001.

As it was described in the preceding paragraphs, CENDEPESCA is facing several fisheries – administrative problems which are not only caused by the lack of the pertinent techniques and expertise but also by much more structural reasons. The institution itself is well aware of this fact. As of today, the performance level of CENDEPESCA has not been the expected one and underneath this situation that is lied the fact that some people alleged the relevance of the existence of the institution or that the Government has not paid sufficient attention to the fisheries sector. Within this context, the approach of this organizational adjustment should not be just on the improvement of the organizational functions but also an excellent opportunity to drastically rebuild the institution from which the future of CENDEPESCA depends.

The objectives and basic strategies according to the document "CENDEPESCA Organizational Adjustment, January 2001" are established as follows.

(1) Objectives

Objectives	Justifications
Closest organization to beneficiaries (fishers, etc.)	So far, most officers had been assigned to the headquarters and their relationship with fishers was weak. In general, fishers did not expect much from CENDEPESCA.
Adequate fisheries management based on science and technology	Very few studies of resources had been conducted added to the delay and deficiency in the preparation of fisheries statistics that results in an inefficient basis for policy making. Furthermore, it is expected to strengthen the responsibility of the presentation of the administrative process, including fishing licensing.
Cross sectional intervention in the fisheries sector through coordination with relevant institutions	In spite of the fact that the fisheries sector was the only source of income for many artisanal fishers, a development approach for fishing community was not considered.
Increase of the administrative coverage	For the same reason stated in paragraph 1, the coverage of the administrative services in most fishing communities has been insufficient.
First step of the organizational adjustment aimed at converting it into an autonomous institution (Fisheries Secretariat) in the future	In the future, it will become an autonomous administrative institution in organizational and budgetary terms.

(2) Basic Strategies

Basic Strategies	Description
Power decentralization	To create six local offices throughout the country and transfer the capacity to register fishing boats, to issue fishing permits and to prepare the corresponding regional fisheries development plan.
Zoning	To define the jurisdictional "zones" for each of the above mentioned six local offices in order to facilitate the promotion of the fisheries development according to each zone.
Local offices strengthening	To promote strategies to strengthen local offices, including personnel reassignment, infrastructure improvement, etc. in order to decentralize the functions of each office.
Operations management through a process and team work approach	To establish systematic and functional management compliance so that officers do not have to carry out their duties on an individual basis. By doing so, the relationship with fisherman would be also at institutional and not at individual level. At the same time, management should be more transparent.
Engineering staff training and coordination with relevant specialized institutions	To train the technical staff presently lacks expertise and to improve the inter-institutional relationship with the existing organizations in order to promote the activities that are necessary for fisheries management.

The organizational adjustment of CENDEPESCA had been previously discussed in several opportunities. The first discussion was in the Modernization Project of the Fisheries Public Sector implemented with the assistance of FAO where the excessive number of employees, the enlargement of the administrative units, lack of relationship with the field, and the capacity to diagnose the current situation were pointed out as the problems. CENDEPESCA had a total of 226 officers but the project recommended to reduce it by 80 employees.[1] This situation has improved and the present number of employees is 150. The second discussion was made when the Special Fisheries Commission created by MAG presented the proposal of the organizational adjustment of CENDEPESCA with the assistance of PRADEPESCA,[2] with the following alternatives. In addition, in this case, the restructuring design of the institution included 100 to 120 officers.

① Autarkical administrative organization giving priority to research and policy making.
② Autarkical administrative organization giving priority to providing services to fishers.
③ Organization under the authority of MAG aiming at increasing the services coverage based on decentralization.

[1] Technical Report: National Fishing Economy and Planning Consulting, Institutional Modernization Assistance, CENDEPESCA, 1995
[2] Proposal of an institutional organizational structure for the fishing and aquaculture sector, MAG, 1999.

Figure 12-1 shows the organizational chart of the institution after the organizational adjustment. When comparing the three alternatives mentioned above, the intention to manage the technical and policy making units as well as the increase of the services coverage and the strengthening of the policy making capacity are reflected.

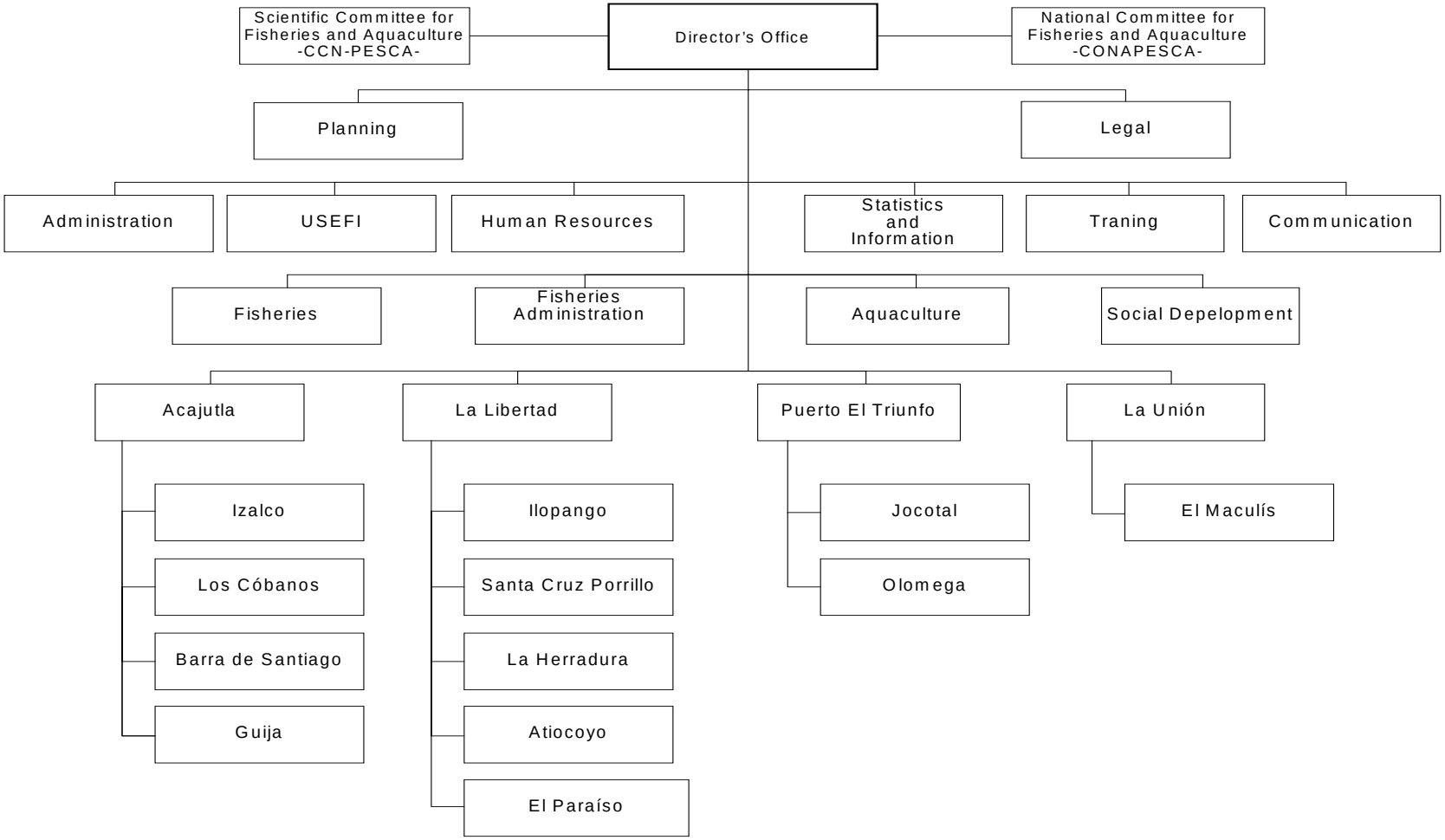

Figure 12-1: CENDEPESCA's Organizational Chart after the Organizational

12.1.2 Progress of the Organizational Adjustment

(1) Progress of the Plan

The organizational adjustment process started at the beginning of 2001 and is still in its preliminary phase. The same as the general plan, it intends to complete the adjustment in two years until the end of 2002 in order to transfer the institution to an autonomic institution.

As of the date on which the present Study was carried out (March 2002) the following steps had been completed and the adjustment plan of the different units of the headquarters as well as of the local offices is being drafted.

① Drafting of the Organizational Adjustment Master Plan
② Reorganization of the headquarters units and zoning
③ Definition of local offices and divisions
④ Appointment and reassignment of the headquarters and local offices key personnel
⑤ Promote generational change in the staff
⑥ Clarify the division of responsibilities of each department

(2) Progress of Personnel reassignment

In order to implement the basic policies set out in the preceding section, it was necessary to reactivate the institutional staff. This is how a change in personnel was promoted as an integral part of the organizational reform process. In December 2000, the alternative to drastically downsize human resources in order to hire new personnel on a later date was analyzed though it was finally decided to only reallocate the staff at this point. This process was intensified particularly starting in 2001. Nineteen people were hired this year. This number is the same as the number of people hired in ten years, between 1990 and 1999. Concomitantly, the existing personnel was evaluated for reorganization purposes, and as a result, thirty-three members of the staff, particularly the oldest, left the institution by the end of 2001. Therefore, it can be said that the personnel reorganization process advanced at an accelerated pace.

Figure 12-2 shows a comparison per age structure of CENDEPESCA staff before and post-reform based on the date of admission. As it was mentioned above, most of the retirees had already reached the age of retirement and it is deemed that they started working at CENDEPESCA in the '70s. It is estimated that before the reform, 70% of the total was made up by individuals of ages between 45 and 60. Because of the restructuring, this group was reduced to 40% of the total. While the change of new personnel is not going to be so fast in the next coming years, in case young individuals are hired to

replace those who will retire, in the future it will be possible to reach an ideal balance of the age structure.

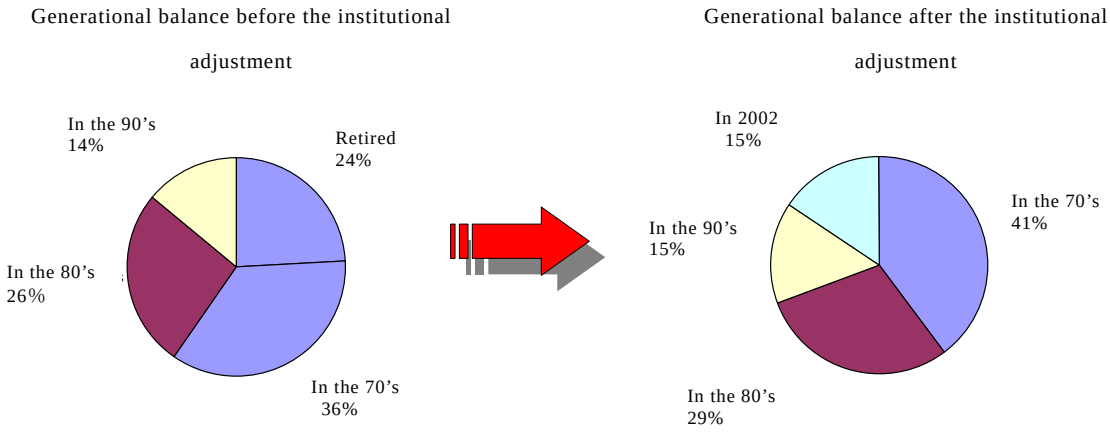

Figure 12-2 Change in the age structure of the staff
(Per date of staff admission)

Table 12-1 shows the distribution of human resources according to their functions after the reallocation conducted from 2000 to date. In the new organizational chart just before the organizational restructuring, it can be observed that fishing production sites were more emphasized. In 2001, the number of employees in CENDEPESCA was reduced from 150 to 130 people that is near the ideal level proposed in the recommendations for the organizational reform prepared in 1999 (with PRADEPESCA cooperation).

It indicates that the management and main office support units have been downsized. Strategic planning, research and development, and human resources training units still continue to be weak. Furthermore, the size of the management unit continues to be big since it represents one-fifth of the total staff. While there are several aspects that still need to be improved, it can be said that the size and balance of the different units in general has been optimized.

As it was mentioned before, since the organizational adjustment faces the increase of the services coverage and sectorial policy making, there is an absolute lack of technical personnel for this purpose. For example, the staff for the Fisheries[3] unit and Aquaculture Units has not been appointed and the new Social Development Unit only has two officers.

(3) Expected functions of the Units and Local Offices

[3] Initially, it has been proposed that the functions that the Fishery Unit should carry out will be taken over by the local office of El Triunfo.

Table 12-2 indicated the responsibility divisions based on CENDEPESCA's 20002 Annual Operative Institutional Plan.

The division of responsibilities is clearly defined in the operation plan, although at the moment, not all the departments and units can carry out all the assigned tasks. The organizational adjustment has stopped at the optimization of the size and the balance of the departments and units in quantitative terms, while in qualitative terms restructure needs to be completed.

Table 12-1 Human Resources Distribution of the CENDEPESCA according to their

Duties after Reassignment

Duties	Description	Classification	Right after the organizational reform			At the present (Feb. 2002)		
			Number	%	Ratio	Number	%	Ratio
Strategic management	Drafting of the organization's strategies, extra institutional policy actions	Director's Office	4.0	2.6	1	4.0	3.1	1.0
Middle management	Technical support to strategic management. Liaison between strategic management and operative units. Supervision of operative management	Planning Unit Head of each unit and local offices directors (0.5 persons each)	13.5	8.8	3.5	12.0	9.3	3.0
Strategic operation	Execution of the policy planning operations	Half of the Fisheries Unit Half of the Aquaculture Unit Fisheries Administration Unit Social Development Unit Statistics Section of the Data Processing and Statistics Unit Legal Unit (0.5 persons which correspond to the heads of each unit are not included)	9.5	6.2	2.5	9.0	7.0	2.3
Field operation	Execution of field operations	Each local office Cooperation Unit (0.5 persons which correspond to the heads of each unit and local office are not included)	83.0	53.6	20	74.5	57.8	8.6
Research and development, human resources training	Introduction and accumulation of new technology and know-how. Studies and necessary research for future strategy making Strengthening of the human resources of the organization	Half of the Fisheries Unit Half of the Aquaculture Unit Half of the Human Resources Unit Half of the Communications Unit (0.5 persons which correspond to the heads of each unit are not included)	3.0	2.0	0.8	2	1.6	0.5
Administration and support	Necessary logistic support for the operation of each of the above mentioned duties. Financial management and accounting Human resources and general issues management	Administration and Finance Unit Half of the Human Resources Unit Half of the Communications Unit Data Processing Section of the Data Processing and Statistics Unit (0.5 persons which correspond to the heads of each unit are not included)	41.0	26.8	10	27.5	21.3	6.9
Total			153	100.0		129	100	

Table 12-2 Functions expected from each CENDEPESCA Unit

Director's Office/ Unit	Expected functions
General Director's Office	' Coordinate the institutional development process. ' Set up coordination mechanisms with public and private agencies in order to promote an active participation in the development of the Sector. ' Coordinate the implementation of management and technical and operating policies and direct them towards their application at institutional level. ' Coordinate the implementation of fishing and aquiculture development policies and strategies, and proposals for plans, programs and projects that will allow their implementation. ' Represent the Institution in all acts and contracts required for the performance of its duties. ' Coordinate and follow actions to obtain resources from the external cooperation. ' Establish and maintain permanent communication mechanisms with the Minister's Office in order to identify and solve institutional problems. ' Coordinate efforts with the actors involved in order to comply with the laws, regulations and other standards related to fishing and aquiculture activities. ' Represent the Institutions in Official Missions inside and outside the country by express delegation or as required. ' Chair and coordinate the National Fishing and Aquiculture Council (CONAPESCA). ' Direct and participate actively in the meetings of the Technical Consultative Committee. ' Execute the decision- making process within the established legal competence framework.
Planning	' Plan and provide advice to the institutional strategic planning process. ' Coordinate actions aimed at putting in place the strategic planning and institutional development process. ' Plan and conduct the identification, formulation and assessment of institutional plans, programs and projects. ' Participate in the negotiation of agreements concerning the exploitation of hydro-biological resources and the

	setting up of new markets. ' Promote the negotiation and execution of fishing and aquiculture development projects related to the public and private sectors. ' Integrate interinstitutional working teams and/or technical committees with regard to compliance with agreements. ' Provide advice and support to obtain resources from the external cooperation and direct their adequate allocation. ' Provide advice and support to the formulation of sectorial and institutional policies and strategies. ' Provide advice and support to the institutional follow up and evaluation system. ' Set up monitoring and affect indicators in order to know and assess the behavior of the Sector.
Legal	' Provide legal advice to the General Director's Office and at various levels of the Institution in order to contribute to the legal and administrative- financial decision - making. ' Set up coordinating mechanisms inside and outside the Institution in order to contribute to the updating and due compliance with the legal instruments addressing fishing and aquiculture activities.
Administration	' Coordinate and implement policies addressing the efficient use of the allocated resources. ' Coordinate the process for the procurement and supply of goods and services, storage of material resources and fixed inventory. ' Keep updated records and controls for the procurement and supply of goods and services. ' Keep the physical infrastructure of the institution in good operating conditions. ' Provide services for motor vehicle maintenance and control, telephone communication, photocopies, cleaning and ornamentation.
Financial Area (USEFI)	' Plan, direct and execute the financial policy of the Fishing Development Center in compliance with the guidelines issued by the Ministry of Finance and the Institutional Financial Office of MAG. ' Coordinate the planning, execution and follow up of the activities related to the Budget, Treasury, Accounting and Administration of the Special Activities Fund. ' Establish and keep updated records and controls of the financial processes related to the Budget, Treasury,

	Accounting and Administration of the Special Activities Fund. ' Prepare the necessary financial reports in support to the decisions made by the Board of Directors and those made in compliance with the legal norms set forth by the Institutional Financial Office of MAG or by the Ministry of Finance, as the case may be.
Human Resources	' Establish and coordinate policies for the efficient use of the allocated human resources. ' Coordinate the execution of activities related to training, record and control, employee welfare and administration processes in general of the human resources of the Institution. ' Establish and maintain updated records and controls of the human resources management processes. ' Prepare reports in support to the decisions made by the Board of Directors of the Institution and those made in compliance with the legal norms addressing human resources issues set forth by the General Administration Office of MAG or by the Ministry of Finance, as the case may be. ' Ensure compliance with the legal provisions in place addressing human resources management issues. ' Set up coordinating mechanisms inside and outside the Institution in order to formulate, propose and implement human resources development programs.
Statistics and Computing	' Set up and keep updated a specialized fishing statistics and information system. ' Implement a data gathering, processing and analysis system that will provide reliable and timely fishing statistical records. ' Provide technical support in software application, manage, and control the institutional communications network. ' Keep an updated inventory of hardware and software resources and a documentary library of local environment applications. ' Participate in the development and execution of plans and in the preparation of technical specifications. ' Provide training to technicians and users in the application of final tools.
Social Development and Training	' Provide support to the Zone Offices of the Institution in the design and execution of training programs for technicians, fishing and aquiculture organizations as well as to non-member users.

	' Provide guidance for the organization of fishers and those engaged in aquiculture activities, fishing regulations, and management and protection of bodies of water, and execution of production projects. ' Provide support to the setting up and consolidation of fishing and aquiculture co-management models. ' Prepare posters, bulletins and other audiovisual materials necessary for the development of training programs. ' Keep updated record of fishing and aquiculture organizations. ' Promote the interinstitutional coordination with public, municipal and private organizations involved with the execution of training and organization programs related to fishing and aquiculture.
Communications	' Provide the population with updated information on institutional management through the media. ' Prepare informative material related to fishing and aquiculture activities. ' Establish interinstitutional liaisons or links that facilitate compliance with the objective of interinstitutional communication. ' Keep a fishing and aquiculture information database as well as internal and external documentation. ' Develop actions contributing to improve the interinstitutional image. ' Coordinate and provide coverage to events related to fishing and aquiculture.
Fisheries	' Direct and guide the execution of technical and scientific research related to the evaluation of sea and fresh water fishing resources in support to fishing activity regulations. ' Direct and guide the execution of the generation, validation and transfer process of transfer of harvest technology in order to make a sustainable use of species of commercial interest. ' Coordinate the execution of technical assistance and training programs for small- scale sea and continental fishing. ' Keep updated the scientific and technical information database in order to support the regulation of sea and continental fishing activities. ' Participate in the formulation and/or execution of programs and projects related to the development fishing activities. ' Provide support to fishing management processes and implementation of the Fishing and Aquiculture Law, and to

	the generation of technical and statistical information.
Fishing Management	' Direct and provide guidance for complying with the regulations for fishing and aquiculture activities through expeditious and adequate procedures to have access to fishing and aquiculture activities. ' Coordinate and supervise the setting up of the necessary registries of fishing and aquiculture activities in order to have reliable and timely information that will contribute to improving the supply of services to the user. ' Coordinate the drafting of resolutions aimed at regulating fishing and aquiculture activities. ' Coordinate the adoption and implementation of measures and standards for fishing and aquiculture and other related areas. ' Establish mechanisms for the dissemination of the national, regional and international fishing regulations. ' Ensure compliance with the national fishing and aquiculture legislation in order to contribute with adopted regional and international regulations.
Aquiculture	' Direct and provide guidance to the technology generation and transfer process through research, training and technical assistance to aquiculture producers. ' Coordinate the execution of fish stock production of commercial interest intended for aquiculture and restocking of bodies of water. ' Coordinate the generation of technical and scientific information in support to aquiculture activities. ' Set up and keep updated a database with technical and scientific information in order to support aquiculture development. ' Provide support to the formulation and/or execution of plans, programs and projects aimed at the promotion of aquiculture. ' Coordinate efforts with other public and private institutions through aquiculture outreach and promotion programs. ' Provide support to the fishing management processes and to the implementation of the Fishing and Aquiculture Law, and to the generation of technical and statistical information.
Zone Offices	' Coordinate and promote the local development process through the consolidation of co-management actions.

	' Coordinate the execution of training and technical assistance programs, production of commercial species stock, and recruitment of fish species in bodies of water. ' Provide support to database updating through technical and scientific data generation and/or gathering, processing and analysis of fishing and aquiculture statistical information. ' Provide support to the formulation and/or execution of fishing and aquiculture development programs and projects. ' Coordinate the implementation of fishing management processes, and compliance with the Fishing and Aquiculture Law.

Source: 2000 Annual Institutional Operating Plan of CENDEPESCA.

12.2 Problems of the Organizational Adjustment

In October 2000, a workshop to analyze the organization was conducted within the framework of the present Study. The methodology ID/OS (Institutional Development and Organizational Strengthening) was applied in order to detect all the problems that CENDEPESCA officers themselves had already identified. This workshop was organized before the organizational adjustment was made public, and could catch a glimpse of the perception of the officers before restructuring. The priority tasks identified in this workshop are: “lack of budget”, “lack of professional staff”, “low salary level”, etc. While the strength of the institution was perceived as: “an institution specialized in fisheries”, “personnel with experience”, “aggressiveness in the performance of the work”, etc. There is a gap between the officers’ perception and the objective and strategies of the organizational adjustment, and therefore, it is necessary to change the personnel’s mentality parallel to the restructuring process.

The existing problems in the organizational adjustment in progress are described below.

(1) Priority Tasks have not been Clearly Defined

As it was mentioned in paragraph 12.1.1, the Organizational Adjustment Master Plan establishes the different challenges and activities but the order of priority is neither clear nor specifies the necessary activities to achieve the tasks. On the other hand, the five tasks listed as the Basic Policy in the Organization Manual have a parallel relationship and do not specify clearly the relationship of each of them with the organizational adjustment. Besides, not all the heads of unit and local offices directors know the contents of the Organization Manual.

Figure 12-3 shows the diagram of the problems experienced CENDEPESCA and Figure 12-4 the diagram of objectives of the organizational adjustment. They are based on the existing reports and interviews with the people involved. As in can be seen in Figure 12-3, the present problems can be gathered in two big categories: the first category includes issues related with policy making, and the second relates to the execution of policies. Logically, policy-making precedes the execution, and therefore, the increase in the policy-making capacity has higher priority. However, this issue has not been sufficiently analyzed and discussed. The annual operative plans submitted by each unit and local office intend to cover all the needs and therefore their priorities within the organizational adjustment are not clear.

(2) A Clear Time Schedule of Activities has not been Defined

The time frame of the activities to be executed in the organizational adjustment is neither defined in the Master Plan nor in the Operative Manual. This definition is of utmost importance in order to address multiple tasks within a limited period of two years. The diagram of problems (Figure 12-3) shows the different tasks adjusted to the priority to increase the planning capacity that was mentioned in paragraph (1). A clear time schedule for the execution of the organizational adjustment has not

been defined yet. It is deemed necessary to define it in order that each unit and local office revise their respective operatives plans with a clear idea of the general objective of the organization.

(3) The Goals (Indicators) of the Intermediate Evaluation and the Evaluation Method have not been Defined

The specific goals and objectives that should be achieved have not been defined. Although some indicators were established, many of them are not sufficiently justified. A specific evaluation methodology has not been defined either.

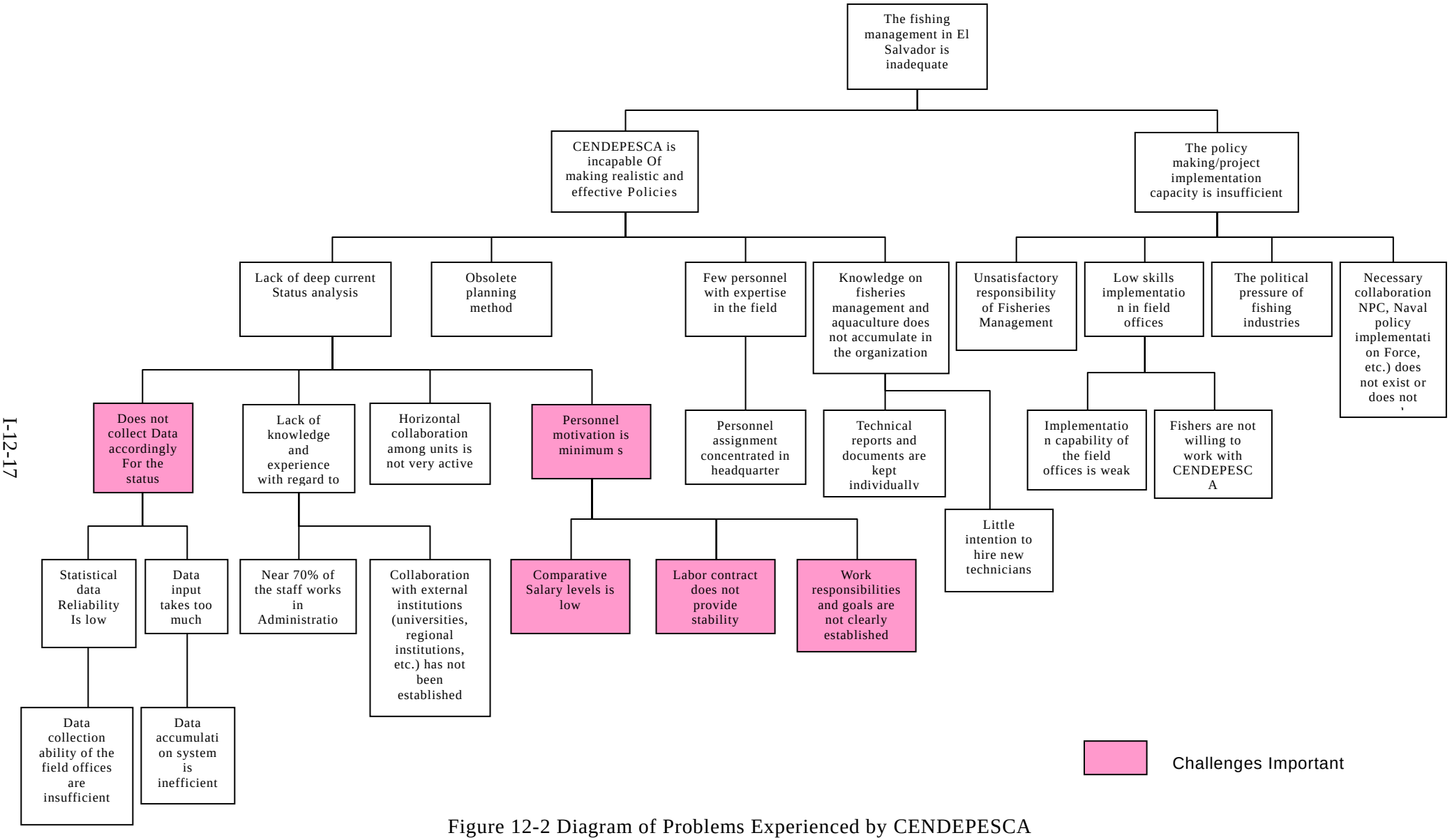

Figure 12-2 Diagram of Problems Experienced by CENDEPESCA

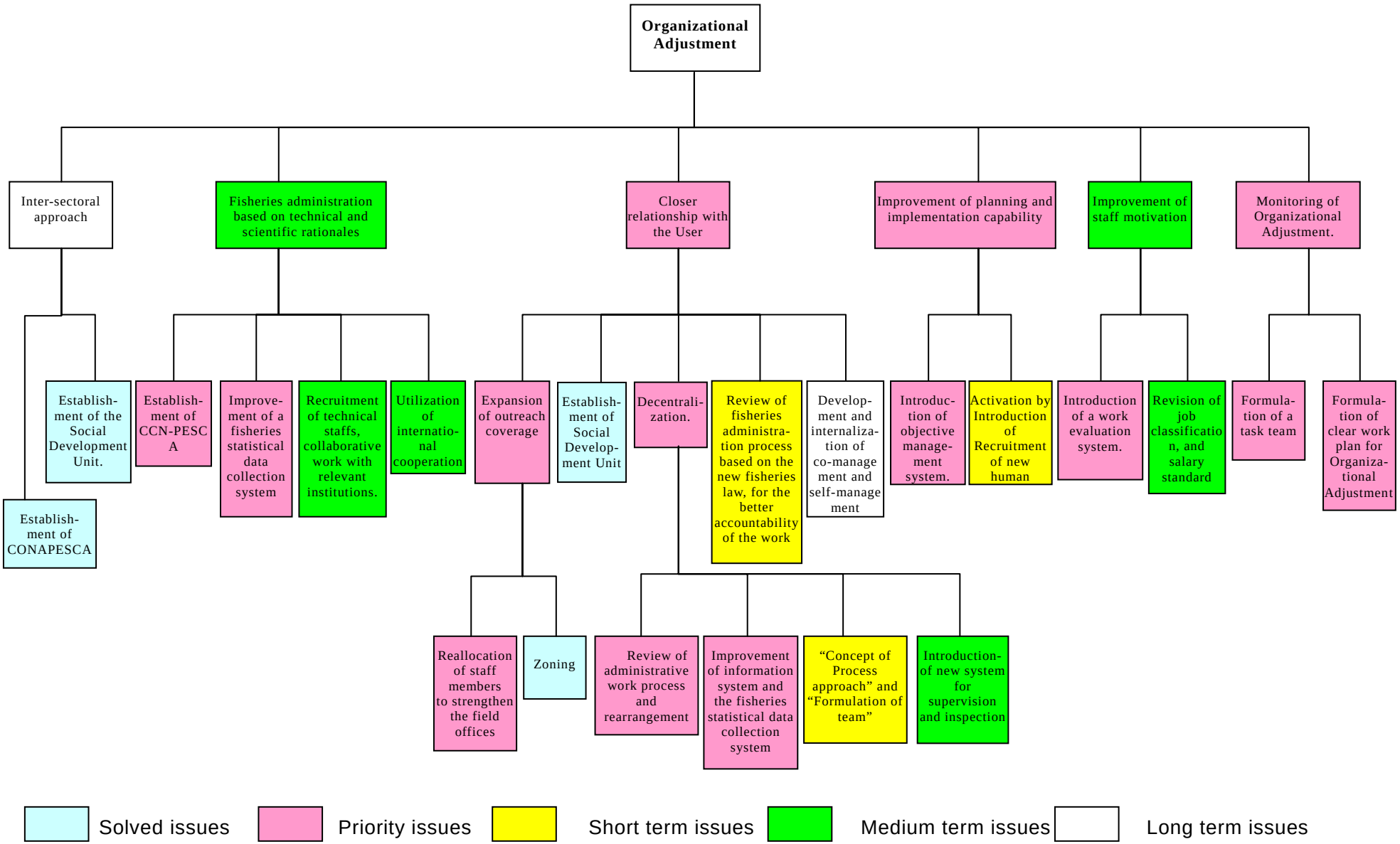

Figure 12-3 Diagram of Objectives Related with the Organizational Adjustment of CENDEPESCA

(4) The Planning System has not been Standardized

One of the greatest problems among those described in paragraphs (1) to (3) could be the lack of standardization of the system to prepare and manage the action plan and that each head of unit or local office director prepares the planning according to his own methodology. The conventional top-down planning method was implemented by assigning the various tasks defined in the sectorial development plan to each operative unit. In the new organization, it is necessary to define the objectives and activities to be performed with the bottom-up methodology, starting from each unit and local office with a clear idea of the general objective of the institution.

The planning system and plan management should become a comprehensive framework of standardized planning and monitoring and evaluation methodology aimed at the achievement of objectives. However, since CENDEPESCA does not have sufficient experience in the subject, there is a need of extrainstitutional[4] technical support

(5) There is No Organizational Adjustment Official Team

At present, the general director is practically in charge of the general coordination of the organizational adjustment. However, this process is too complex to be carried out by the general director alone and the presence of an assistant is essential. The Planning and Strategy Unit, which is the unit in charge, does not have sufficient experience to carry out the institutional strengthening, and therefore, it is necessary to hire personnel or look for extrainstitutional technical cooperation.

(6) The Administrative Units are still large

The problems faced by the administrative units are four. The first of them is the size of the units. As shown in Table 12-1, the units are still too big even after the adjustment since in terms of number of human resources, they represent 24% of the total and 54% only in the headquarters at the beginning of 2001. However, the three alternatives proposed in 1999 by the Special Fisheries Commission previously mentioned established the ideal percentage for these units between 12 and 18%, increasing efficiently and reducing the size. In order to increase the professional staff, it is required to define the adequate floor levels and ensure the corresponding budget. This means that it is indispensable to further reduce the size of the administrative units.

The second problem is the functional balance of the organization. Figure 12-5 has schematized the assignment of personnel according to their duties after reassignment with the Mintzberg model. The scheme to the right shows the common operational structure of an administrative organization in the field and the future image of CENDEPESCA after the reorganization adjustment. By comparing these two models it can be observed how big the administrative units are and how weak the research units

[4] The matrix of the general plan prepared by the Planning Unit of CENDEPESCA adjusts to a format similar to the "logical framework". However, the strategy on which each activity (or result) is based and the relationship among the various activities are not clear. Moreover, the effectiveness indicators are not clear either, and therefore, it is difficult to follow up the achievement of objectives.

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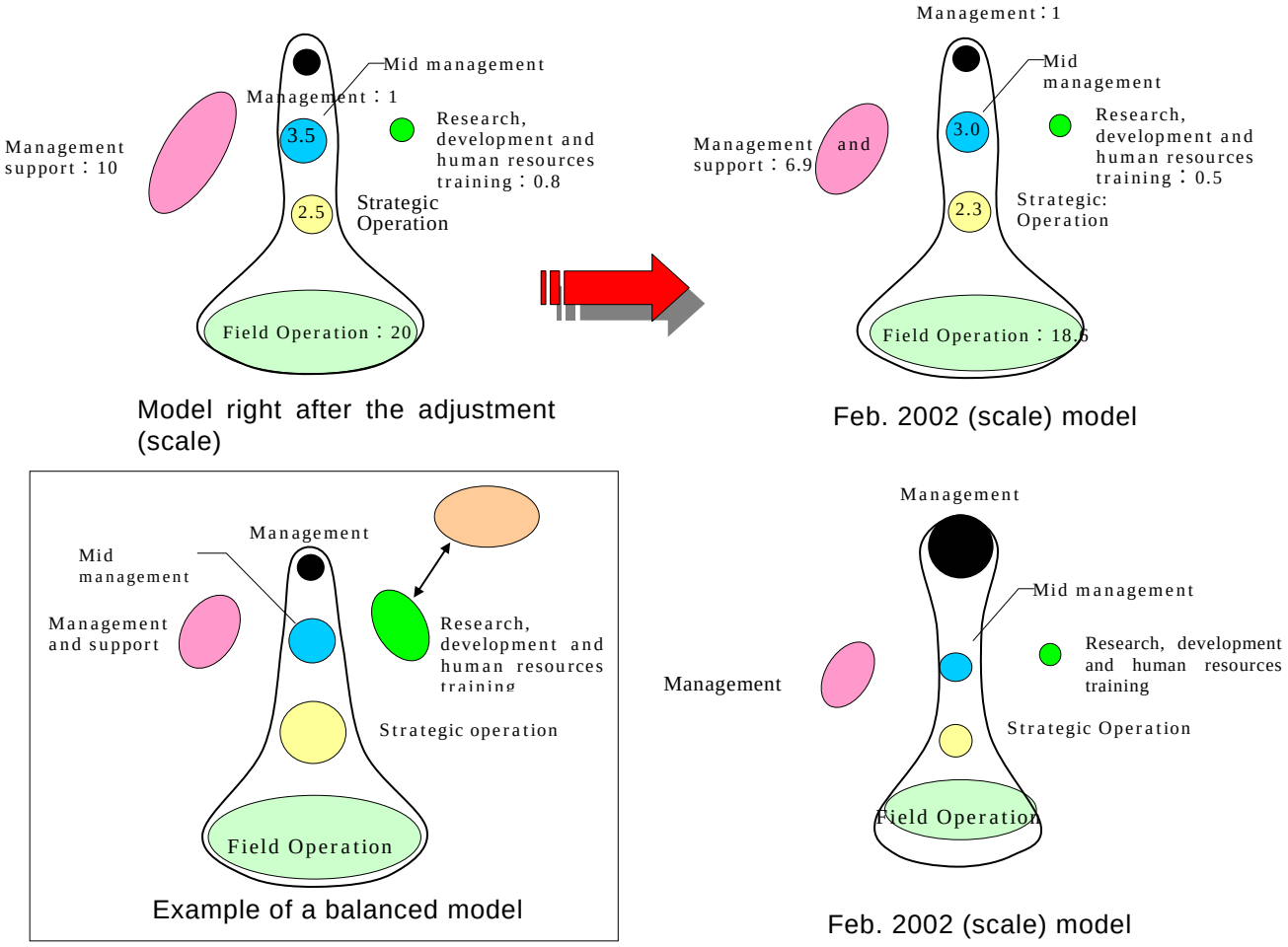

Figure 12-5 Human Resources Distribution of the CENDEPESCA according to their Duties (Mintzberg Model).

In the functional aspect, it is observed that the strategic operations and medium control are done entirely by the general director. In other words, the medium control and the strategic operation are not carrying out their inherent functions (although there is an adequate balance concerning the number of staff) and the responsibilities of taking decisions, from the most detailed to political topics, completely falls into the general director (Figure: bottom right). This situation should be changed as soon as possible, if not, it is taking the risks that institutional reform efforts become useless in the case the general director is replaced.

The third problem is the distribution of the three administrative units. At the present, all of the logistic support of the local offices and facilities maintenance is provided by the Management and Finance Unit of the headquarters. It would be more efficient to redistribute this capacity at local level, parallel to the decentralization process. The fourth and last problem is the most important and deals with the qualifications of the personnel. This problem should be approached with a view to the future

along with the evaluation process that will be addressed in paragraph (8) and with the human resources training program.

(7) The Specific Steps to Strengthen the Local Offices have not been Defined.

While the strengthening of the local offices constitutes one of the keys to this organizational adjustment, the specific steps to promote it have not been defined yet. Many of the local offices have not operated accordingly as of today. Starting this year, the statistical operations, boat registration and fishing permit control have been transferred from the headquarters to the local offices. In order to fulfill these tasks more than strengthening them, the local offices need to be renovated. This means that they need new infrastructure, reorganization of the operative processes, improvement of the technical level of the staff, etc. However, a specific plan of activities has not been set up yet. Interviews with the staff of the local offices show that there is not a clear understanding of the general image of the organizational adjustment and this proves that they are not sufficiently aware.

(8) There are no Solid Mechanisms to Intensify Employee Motivation

In order to promote human resources training efficiently, it is necessary to establish a mechanism to distinguish qualified from non-qualified resources from an impartial and equitable point of view. There are several causes for the low motivations of the employees, and the most important factor is the lack of work performance evaluation. The problem will not be solved if this task is not executed accordingly.