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付属資料

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資料 1 討議議事録 (R/D)

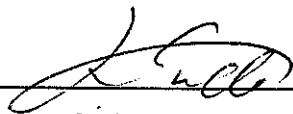
**RECORD OF DISCUSSIONS
BETWEEN JAPANESE PROJECT DESIGN TEAM,
NATIONAL UNIVERSITY AND COSTA RICAN
FISHING AND AQUACULTURE INSTITUTE
ON THE JAPANESE TECHNICAL COOPERATION
FOR THE SUSTAINABLE FISHERIES MANAGEMENT
PROJECT FOR THE GULF OF NICOYA**

The Japanese Project Design Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") visited the Republic of Costa Rica from July 16th, 2002 to July 23rd, 2002 for the purpose of working out the details of the technical cooperation for the Sustainable Fisheries Management Project for the Gulf of Nicoya, Costa Rica.

During its stay in Costa Rica, the Team exchanged views and had a series of discussions with the Costa Rican authorities concerned with respect to the desirable measures to be taken by both Japanese and Costa Rican Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, and in accordance with the provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Costa Rica (hereinafter referred to as "the Agreement"), the Team, National University and Costa Rican Fishing and Aquaculture Institute agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

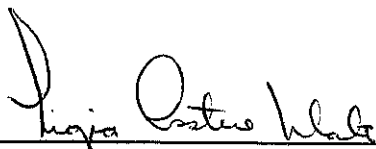
San Jose, July 22nd, 2002



Mr. Kazuo Sudo
Leader
Japanese Project Design Team,
Japan International Cooperation Agency,
Japan



Dr. Sonia Marta Mora Escalante
President
National University,
Costa Rica



Prof. Lilia Castro Ulate
Executive President
Costa Rican Fishing and Aquaculture Institute,
Costa Rica

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of the Republic of Costa Rica will implement the Sustainable Fisheries Management Project for the Gulf of Nicoya (hereinafter referred to as "the Project") in cooperation with the Government of Japan.
2. The Project will be implemented in accordance with the Master Plan which is given in Annex I.

II. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

In accordance with the laws and regulations in force in Japan and the provisions of Article III of the Agreement, the Government of Japan will take, at its own expense, the following measures through JICA according to the normal procedures of its technical cooperation scheme.

1. DISPATCH OF JAPANESE EXPERTS

The Government of Japan will provide the services of the Japanese experts as listed in Annex II. The provision of Article IX of the Agreement will be applied to the above-mentioned experts.

PROVISION OF MACHINERY AND EQUIPMENT

The Government of Japan will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in Annex III. The provision of Article VIII-1 of the Agreement will be applied to the Equipment.

TRAINING OF COSTA RICAN PERSONNEL IN JAPAN

The Government of Japan will receive the Costa Rican personnel connected with the Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF COSTA RICA

1. The Government of the Republic of Costa Rica will take necessary measures to ensure that the self-reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.
2. In accordance with the provisions of Article IV of the Agreement, the Government of the Republic of Costa Rica will ensure that the technologies and knowledge acquired by the Costa Rican nationals as a result of the Japanese technical cooperation will contribute to the economic and social development of the Republic of Costa Rica.
3. In accordance with the provisions of Article V and VI of the Agreement, the Government of the Republic of Costa Rica will grant in the Republic of Costa Rica privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families.
4. In accordance with the provisions of Article VIII of the Agreement, the Government of the Republic of Costa Rica will take the measures necessary to receive and use the Equipment

provided through JICA under II-2 above and equipment, machinery and materials carried in by the Japanese experts referred to in II-1 above.

5. The Government of the Republic of Costa Rica will take necessary measures to ensure that the knowledge and experience acquired by the Costa Rican personnel from technical training in Japan will be utilized effectively in the implementation of the Project.
6. In accordance with the provision of Article V - (b) of the Agreement, the Government of the Republic of Costa Rica will provide the services of the Costa Rican counterpart personnel and administrative personnel as listed in Annex IV.
7. In accordance with the provision of Article V - (a) of the Agreement, the Government of the Republic of Costa Rica will provide the land, buildings and facilities as listed in Annex V.
8. In accordance with the laws and regulations in force in the Republic of Costa Rica, the Government of the Republic of Costa Rica will take necessary measures to supply or replace at its own expense machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided through JICA under II-2 above.
9. In accordance with the laws and regulations in force in the Republic of Costa Rica, the Government of the Republic of Costa Rica will take necessary measures to meet the running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

1. Dean of College of Exacts and Natural Sciences, National University, as the Project Director, will bear overall responsibility for the administration and implementation of the Project.
2. Director of the Biological Sciences School, National University and General Technical Director, Costa Rican Fishing and Aquaculture Institute, as the Project Managers, will be responsible for the managerial and technical matters of the Project.
3. The Japanese Chief Advisor will provide necessary recommendations and advice to the Project Director and the Project Managers on any matters pertaining to the implementation of the Project.
4. The Japanese experts will give necessary technical guidance and advice to the Costa Rican counterpart personnel on technical matters pertaining to the implementation of the Project.
5. For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and composition are described in Annex VI.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by the two Governments through JICA and the Costa Rican authorities concerned, at the middle and during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JAPANESE EXPERTS

In accordance with the provision of Article VII of the Agreement, the Government of the Republic of Costa Rica undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Costa Rica except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.


VIII. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be five (5) years from October 1st, 2002.

ANNEX I	MASTER PLAN
ANNEX II	LIST OF JAPANESE EXPERTS
ANNEX III	LIST OF MACHINERY AND EQUIPMENT
ANNEX IV	LIST OF COSTA RICAN COUNTERPART AND ADMINISTRATIVE PERSONNEL
ANNEX V	LIST OF LAND, BUILDINGS AND FACILITIES
ANNEX VI	JOINT COORDINATING COMMITTEE



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ANNEX I . MASTER PLAN

1. Super Goal

To improve the household incomes of artisan fishermen.

2. Overall Goal

To perform sustainable fisheries.

3. Project Purpose

To construct a sustainable fishery system.

4. Output of the Project

- 1) A fishery resources management plan is appropriately drawn.
- 2) The fishery resources management plan is appropriately implemented.
- 3) The fishery resources management plan is periodically updated.
- 4) A safety improvement policy of shellfishes is drawn.
- 5) A freshness improvement policy of fishery products is promulgated.
- 6) The freshness improvement policy of fishery products in a circulation stage is promulgated.

5. Activities

- 1-1 Elaborate the plan of activities
- 1-2 Understand the actual condition of fisheries
- 1-3 Evaluate the resources of fishing species and exploitable species
- 1-4 Elaborate the plan of resources management
- 1-5 Discuss the plan in the organs concerned
- 2-1 Make the resources management concept well known to fishermen
- 2-2 Manage the artisan fishery organizations
- 3-1 Monitor fishing activities
- 3-2 Monitor fishery resources
- 3-3 Investigate the enforcement situation of the plan
- 3-4 Discuss the revision of the plan in the organs concerned
- 4-1 Understand the present condition of shellfish contamination and toxin accumulation
- 4-2 Propose solutions about shellfish contamination and toxin accumulation
- 5-1 Consider the freshness improvement policy of fishery products
- 5-2 Transfer new technology to fishermen in order to improve the freshness of fishery products
- 5-3 Investigate the levels of improvement in the quality control of fishery products
- 5-4 Guide fishery communities in quality control
- 6-1 Consider the freshness improvement policy in a circulation stage
- 6-2 Train traders

In case in which the Master Plan should be changed due to the situation of the Project, both Governments will agree to and confirm the changes by exchanging Minutes of Meeting.

ANNEX II. LIST OF JAPANESE EXPERTS

1. Long-term experts

- (1) Chief Advisor and Fishery Policy
- (2) Project Coordinator
- (3) Resources Management
- (4) Quality Control

2. Short-term experts

Expert(s) will be dispatched when the necessity arises in the course of implementing the Project.

ANNEX III. LIST OF MACHINERY AND EQUIPMENT

1. Research / laboratory equipment, machinery, and materials necessary for the activities mentioned in Annex I - 5.

2. Other equipment, machinery, materials and spare parts to be mutually agreed upon.

ANNEX IV. LIST OF COSTA RICAN COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. Project Director

Dean of the College of Exacts and Natural Sciences, National University.

2. Project Managers

Director of the Biological Sciences School, National University, and General Technical Director, Costa Rican Fishing and Aquaculture Institute.

3. Counterpart personnel

Suitably qualified personnel, on a full time basis, assigned to each Japanese expert as specified in ANNEX II

4. Other necessary supporting staff

- 1) Administrative staff
- 2) Accounting staff
- 3) Drivers
- 4) Security guards
- 5) Other supporting personnel

ANNEX V. LIST OF LAND, BUILDINGS AND FACILITIES

1. Land for project office and related facilities at the EBM (Marine Biology Station) in Puntarenas and the ECMAR (Marine Sciences Station) in Punta Morales.

2. Buildings and facilities:

- (1) Offices and other necessary facilities with sufficient space for the Japanese experts.
- (2) Services such as power supply, water supply, sewage system, telephone, etc., as necessary for project activities.
- (3) Other facilities mutually agreed upon as necessary.

ANNEX VI. JOINT COORDINATING COMMITTEE

1. Functions

The Joint Coordinating Committee will meet at least once a quarter of the year and whenever necessity arises to:

- (1) formulate the annual work plan for the Project;
- (2) review the annual activities of the Project;
- (3) review and exchange views on major issues arising from, or in connection with, technical cooperation;
- (4) examine the local budget-draft necessary for the Project; and
- (5) others.

2. Composition

The Joint Coordinating Committee will be set up to consist of:

(1) Chairperson: Dean of College of Exacts and Natural Sciences, National University.

(2) Members:

Costa Rican side

- President of the National University.
- Executive President of Costa Rican Fishing and Aquaculture Institute.
- Project Director: Dean of the College of Exacts and Natural Sciences, National University.
- Project Managers: Director of the Biological Sciences School, National University and General Technical Director, Costa Rican Fishing and Aquaculture Institute.
- Counterparts to the Japanese experts, as needed.
- Coordinator of CDCGN (Committee for Conservation and Development of the Gulf of Nicoya).

Japanese side

- Chief Advisor
- Project Coordinator
- Experts assigned to the Project
- Resident Representative of the JICA Costa Rica Office
- Other personnel dispatched by JICA, if necessary

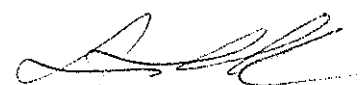
NOTE:

1) Official(s) of the Embassy of Japan in the Republic of Costa Rica may attend the Joint Coordinating Committee as observer(s).

2) Person(s) who are nominated by the Chairperson may attend the Joint Coordinating Committee when required.



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資料2 実施協議ミニッツ

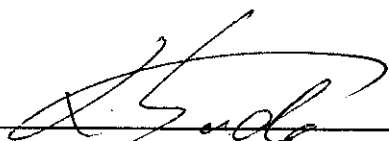
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MINUTES OF MEETING
BETWEEN JAPAN INTERNATIONAL COOPERATION AGENCY
AND AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE RE PUBLIC OF COSTA RICA
ON THE JAPANESE TECHNICAL COOPERATION FOR
THE SUSTAINABLE FISHERIES MANAGEMENT PROJECT
FOR THE GULF OF NICOYA

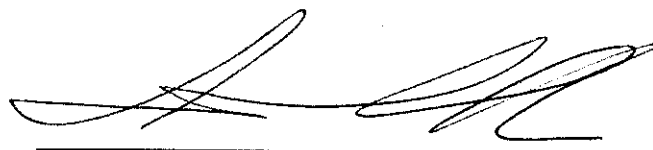
In connection with the Sustainable Fisheries Management Project for the Gulf of Nicoya in the Republic of Costa Rica (hereinafter referred to as the Project), the Japanese Project Design Team (hereinafter referred to as the Team) dispatched by the Japan International Cooperation Agency had a series of meetings and exchanged views and opinions with the Costa Rican authorities concerned, on the rationalization of the Project plan and the justification of the Project implementation.

As a result of the meetings, the Team, National University (hereinafter referred to as UNA), and Costa Rican Fishing and Aquaculture Institute (hereinafter referred to as INCOPECA), reached common understandings concerning the matters referred to in the Project Document attached hereto and the implementation of the Project.

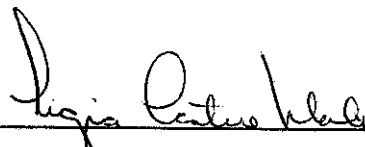
San Jose, 22nd July, 2002



Mr. Kazuo Sudo
Leader
Japanese Project Design Team,
Japan International Cooperation Agency,
Japan



Dr. Sonia Marta Mora Escalante
President
National University,
Costa Rica



Prof. Ligia Castro Ulate
Executive President
Costa Rican Fishing and Aquaculture Institute,
Costa Rica

Attached Document

1 The Agreement on the Project Document

Both the Team and the Costa Rican side agreed on the contents of the Project Document attached hereto.

2 Close Coordination and Collaboration between the counterpart organizations (UNA and INCOPESCA)

Both the Team and the Costa Rican side confirmed that UNA and INCOPESCA would make utmost efforts to ensure close coordination and collaboration between them for the smooth and successful implementation of the Project.

3 Public Relations


The Team explained to the Costa Rican side and the latter understood that it is important to make the Project widely known to the people of the Republic of Costa Rica. Both sides confirmed that information on the Project would be actively disseminated by making best use of all communication tools such as mass media, seminars, leaflet (Project brochure, Project periodical, etc.), Project WEBSITE, etc.

4 The office space for the Japanese experts

The office with sufficient space for the Japanese experts will be prepared in the existing building of the Marine Biology Station (EBM) and be equipped properly with office supplies and equipment necessary to conduct the Project such as phones, office furniture, etc.



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PROJECT DOCUMENT

COSTA RICA

SUSTAINABLE FISHERIES MANAGEMENT

FOR

THE GULF OF NICOYA

July 2002

**UNIVERSIDAD NACIONAL DE COSTA RICA
INSTITUTO COSTARRICENSE DE PESCA Y ACUACULTURA
JAPAN INTERNATIONAL COOPERATION AGENCY**

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List of Abbreviations

CDCGN	Comisión para el Desarrollo y Conservación del Golfo de Nicoya (Committee for Development and Conservation of the Gulf of Nicoya)
CIMAR	Centro de Investigación en Ciencias del Mar y Limnología (Center for Research in Marine Sciences and Limnology)
CNP	Consejo Nacional de Producción (National Council of Production)
EBM	Estación de Biología Marina (Marine Biology Station)
ICT	Instituto Costarricense de Turismo (Costa Rican Institute for Tourism)
IMAS	Instituto Mixto de Ayuda Social
INA	Instituto Nacional de Aprendizaje
INCOPESCA	Instituto Costarricense de Pesca y Acuicultura (Costa Rican Fishing and Aquaculture Institute)
JICA	Japan International Cooperation Agency
MAG	Ministerio de Agricultura y Ganadería (Ministry of Agriculture and Livestock)
MIDEPLAN	Ministerio de Planificación Nacional y Política Económica (Ministry of National Planning and Economic Policy)
MINAE	Ministerio de Ambiente y Energía (Ministry of Environment and Energy)
UCR	Universidad de Costa Rica (University of Costa Rica)
UNA	Universidad Nacional (National University)

1. INTRODUCTION

1.1. Background to Request

The coastal fisheries in the Republic of Costa Rica are recently feared for the reduction of the fishery resources caused by the overfishing and the sea pollution. Although the catch in the Gulf of Nicoya had occupied about 60% of the total catch of the country in 1960s, has been decreasing recently (2,584t in Gulf of Nicoya and 21,569t in the country in 1997).

EBM (Marine Biology Station) of UNA (Universidad Nacional), is located in the coast of the Gulf, requested JICA's Project-Type Technical Cooperation in order to acquire the harmonized techniques with the environment on producing organisms and effective uses of the sea area for implementing a sustainable utilization of marine organic resources in the Gulf.

1.2. Previous actions taken by Japan

(1) First Preparatory Study (February 2001)

The background and contents of the request were investigated in detail and correctly. The situation of the requested project at the national development plan was confirmed as well as the system and possibility of implementation of the project.

(2) Second Preparatory Study (September 2001)

Workshop of PCM was held and the basic design on the cooperation contents was drawn up.

(3) Third Preparatory Study (November 2001)

It had the supplementary investigation about the range of cooperation, the concrete activity plan of the project, enforcement organization, etc., and the framework was checked after several discussions.

(4) Project Design Study (July 2002)

Final discussions have been held about the project document that takes into account the results of these investigations, and the Record of Discussion (R/D) and the minutes of meeting have been signed between JICA and the Costa Rican Authorities concerned.

1.3. Project outline

The project target is putting into the view that "improvement in artisanal fishermen's life income" is performed on a mid- and long-term basis by supposing "A sustainable fishery system is built" and performing a sustainable fishery through a series of cycles of a suitable resources management plan, implementation, evaluation and feedback.

Although a fishery system needs to be built in order for each organization to work according to each duty aiming at a sustainable fishery, the following four items are included with the fishery system said here.

- (1) Based on the scientific data that evaluated the present resources, an appropriate fishery management plan is drawn up, this plan is applied, and it is updated.
- (2) The policy for the sake of the safe disposition of marine products is worked on.
- (3) The policy of the improvement in freshness of captured fish and the fisheries products in a circulation stage spreads.
- (4) The interest to the quality of fisheries products increases.

1.4. Validity and Implementation

This project aims at building a sustainable fishery system to the Gulf of Nicoya by fishery resources management and the quality control of captured fish, and this agrees with " the development of a fishery field and the sustainable production " policy which is contained in the Costa Rica agriculture and livestock development plan (1998- 2002). Moreover, relationship among the concerning organs and organizations is built through this project.

2. PROJECT BACKGROUND

2.1. Socio-economic Context

2.1.1. Politics

Political system of Costa Rica is a constitutional republicanism that makes the President a sovereign. The terms of office of the President and the Diet members (single chamber system) are four years respectively, and they are elected by the national direct election. The President is banned on reelection, and the reelection for the Diet members is banned in the continuous term of office. Costa Rica is one of the countries which are most politically stable in Central America, and it is the features of this country that an army does not exist but the tradition of civilian politics is kept, that the educational level is high (about 6.5% of non-literacy, 1999, source: Statistic Division in Ministry of Education), that the difference of wealth and poverty is comparatively small, that they are conservative national traits, etc. About diplomacy, the friendship for USA, peace good neighbor and respect for human rights have been lifted traditionally, and the omni-directional diplomacy is aimed at as much as possible mainly with the United Nations and the Organization of American States.

2.1.2. Economy

The economy of this country resulted in a crisis accompanied by a high inflation rate and a high unemployment rate, and minus growth taking advantage of the accumulated debt failure problem in the beginning of the 1980s. To this crisis, the prescription of IMF and the World Bank was received positively, the import substitute industrialization route that had been the conventional development strategy was thrown away, and the structural adjustment was carried out. The prosperity of secondary industry and tertiary industry favored the economic growth rate during 1983-1997 that was a little more than 4%. Although this country has been called one of the countries where the rate of employment is the highest in Central America, the unemployment rate was 4.1% in 1993, 5.7% in 1997 and in recent years, it becomes cloudy in the employment situation. It is the feature that especially the employment rates of the Caribbean Sea and a Pacific coast part are lower than the national average.

2.2. Description of the sector/sub-sector

2.2.1. Status of Fisheries

2.2.1.1. Coastal and Offshore Fisheries

The fishery of Costa Rica is statistically divided roughly into coastal fishery and the tuna fishery. However, statistical coastal fishery points out every catch by its own country fishing boats, and the catch by offshore fishery is also included. On the other hand, the statistic of tuna fishery indicates that only foreign vessels are conducting tuna fishery in Costa Rican waters (fishing amount of tuna: about 27,000t in 1999).

Although the coastal and offshore fisheries are performed by artisanal fishermen and fishery companies (Semi-industrial) and the total fishing amount in the country is recently about 20,000t per year, the 98% is occupied by landing of the Pacific coast and the amount of landing of the Caribbean Sea coast is few which is 400t, more or less. The subject of the coastal and offshore fisheries is an artisanal fishery, and the artisanal fishermen land 80% or more of catch (Table 1). And 70% of the marine products of Costa

Rica are landed in Puntarenas.

Table 1. Landing amount of coastal and offshore fisheries (Pacific coast) (MT)

Category	1997	1998	1999
Shrimp Fishery	3,342 (15.8%)	2,824 (15.8%)	3,817 (18.5%)
Artisanal Fishery	17,806 (84.2%)	15,087 (84.2%)	17,191 (81.5%)
Total	21,148 (100.0%)	17,911 (100.0%)	20,008 (100.0%)

(Informe de Labores 1999 - 2000, INCOPECA)

2.2.1.2. Artisanal fishery

Artisanal fishery in Costa Rica is classified in three categories as follows:

- (1) Small scale artisanal fishery (up to 3 miles)
- (2) Middle scale artisanal fishery (3 to 40 miles)
- (3) Advanced scale artisanal fishery (40 or more miles, Longline fishing only)

We hereafter call "artisanal fishery" in this document, it means "small scale artisanal fishery".

The artisanal fishery is the most important in providing the demand of the fisheries products in Costa Rica, and it is supposed that the 85% of the fishermen belong to artisanal fishermen. This fishery is performed with a small boat (Length of boat: about 6m or lesser) that is called "panga", "bote" or "lancha" with an operation less than 3 days. The main fishing gears used are gill net, small-scaled longline, and hand-line fishing. There are 50 or more fishing communities along with the Pacific coast. The characteristics of the artisanal fishermen are that their education level is low, their living and health conditions are not good, etc.

2.2.1.3. Company fishery

The fisheries classified as a company fishery (Semi-industrial) are shrimp trawlers and sardine purseiners, and all of 73 shrimp trawlers are in operation on the base in Puntarenas. The fishery companies are grouped into chambers such as UNIPESCA and Camara Puntarenas de Pescadores that are boat-owner's organizations. The longline fishing vessels have their own association. In the case of a longline vessel, operated duration is about a maximum of two months for a large vessel (about 75-80 feet), during 12 to 15 days by a medium vessel (about 40 feet), and, in the case of a shrimp trawler, it is about a 15-20 day period. The by-catch with the economical value in the shrimp fishery is landed in Puntarenas. The parts of the products without value are used as bait but the greater parts are abandoned at sea.

2.2.1.4. Aquaculture

In Costa Rica, fish culture was performed in enterprises about tilapia, shrimp, rainbow trout, freshwater shrimp and Piangua, and the quantity of production in 1999 except Piangua was 9,324t (Table 2. Culture of Piangua has just come to be performed recently and it is not included in statistics).

Table 2. Aquaculture production in Costa Rica (MT)

Species	1997	1998	1999
Tilapia	4,817.0	5,346.0	6,588.0
Trout	152.0	104.0	181.0
Shrimp	2,404.0	2,348.0	2,465.0
Freshwater prawn	78.5	86.6	90.0
Total	7,451.5	7,884.6	9,324.0

(Informe de Labores 1999-2000, INCOPECSA)

Land areas developed for aquaculture increased 1.61 times from 944ha in 1997 to 1,552 ha in 1999. As a background that the aquaculture areas are increasing, the increase in entry in the aquaculture enterprise from the dairy by its depression, the saline enterprise by price inactivation of salt, etc. is mentioned. The number of aquaculture enterprisers in 1999 is 772, in which there are 583 enterprisers of tilapia culture that form 75.5% of the whole aquaculture. INCOPECSA has aquaculture stations in four places: Cañas, Guapiles, San Carlos, and Cerro de la Muerte, and they are in charge of aquaculture promotion. The quantity of seed production in 1999 totaled 1,612,233 and the selling price was 20,495,265 colons. The species for aquaculture are tilapia, freshwater shrimp, rainbow trout and escargot. Mariculture is not conducted by INCOPECSA.

2.2.2. Fishery in the Gulf of the Nicoya

2.2.2.1. Artisanal fishery in the Gulf of Nicoya

The main fishing ground of the shrimp fishing in the Gulf of Nicoya by artisanal fishermen, carried out all over the districts inside of the Gulf, is along a northern coast with much deposition mud especially by inflow of main rivers. The fishing gear is gill net and it is made from a monofilament with 183.2 X 2 m in length, the 3 inches in mesh and about 1.5m in depth. The outboard motor ships of FRP with a length of about 6m are subject for a fishing boat. It is presumed that a little more than 2000 boats including unauthorized boats are in operation. Day's trip operation is carried out by 1 gill net per fishing boat, and drum fish (Corvina), etc. is unintentionally captured as a by-product. The main fishing ground of snapper (Pargo) is the circumference of a Negritos island, and that of drum fish (main three species) is the whole region inside of the Gulf, and especially, it applies from Torro island to Chira island with the gill net (3.5 inches in mesh) and from Chira island to a Caballo island with the net (5-7 inches in mesh), the small longline of about 80 hooks, etc. Grouper (Cabrilla), barracuda etc. are fished in front of Tarcoles. About 20 or so fishing villages, such as Chomes, Fila Pajaros, Manzanillo, Isla Chira, Isla Venda, Isla Caballo, and Tarcoles, exist around the Gulf. The number of artisanal fishermen who operate in the Gulf is estimated about 3,500 and generally they have the feature of low educational level, low income and poor living standard.

2.2.2.2. Fishery production in the Gulf of Nicoya

Fishery production of the Gulf of Nicoya has been decreasing and decreased about 48% from 1985 to 1995 (5360t to 2800t in quantity). The average fishing amount classified by

fish category in the Gulf of Nicoya from 1990 to 1997 is 3401.9t as in Table 3.

Table 3. Average fishing amount in the Gulf (1990 - 1997)

Fish category	Fishing amount (MT)
Fishes	2855.2 (84.0%)
Shrimps	516.8 (15.2%)
Lobster	1.2 (0.03%)
Mollusks	24.0 (0.7%)
Others	4.6 (0.1%)

(INCOPESCA)

(1) Production of fishes

60% of the fishes landed are the small fish called *Primera pequena* (784.1t, 23.0%), *Chatarra* (638.3t, 18.8%), and *Sardina* (597.8t, 17.6%).

In the Gulf of Nicoya, 320 species of fishes are identified and 145 species are fished inside. It is about 25 species supposed commercially important among those.

By catch by the shrimp trawlers

30% of the unintentionally captured fish by the shrimp trawl in the Gulf of Nicoya are drum fish (*Corvina*, species of *Scianidae*) and it forms 26.3% of the number of caught fishes (Gamboa, 1992). Moreover, six species are adult fishes called 1st category, and occupy 21.1% in number. The individually most frequent species are el bobo (*Polydactylus approximans*, 16.7%), el roncador (*Haemulopsis leuciscus*, 15.4%) and las corvinas (*Cynoscion reticulates*, 9.1% and *Micropogonias altipinnis*, 7.0%).

(2) Production of Crustaceans

In the Gulf of Nicoya, 243 species are reported of the whole crustaceans. Those are shrimps of 79 species, crabs of 163 species and a spiny lobster. The species exploited commercially are 8 species, and the most important species of those are *Litopenaeus occidentalis*, *L.stylirostris*, *L.vannamei* called "Camaron blanco".

(3) Production of mollusks

90% or more of the shellfish production by shellfish extraction is known as piangua (*Anadara* sp.). 485 species of mollusks are reported in the Gulf of Nicoya. In those 253 species are of gastropods, 229 of bivalves and three of cephalopods (two species are cuttlefish and one is octopus). Commercially important species are six of bivalves, three of cephalopods and one of gastropods. Although it is thought in FAO that 48 or more species of mollusks are edible, and these probably live also in the Gulf, there is no information about the population of these species and the research on the distribution or amount of habitations has not yet been made, either.

2.2.3. Market and Circulation of Fisheries Products

2.2.3.1. Present status of the market and circulation

It is mentioned as special conditions of Costa Rica that the brokerage contractors and the fishery companies have their own landing institutions and artisanal fishermen coming at the landing piers sell them their catches. Moreover, it is defined by law that

the fisheries products sold in Central Valley such as San Jose and Heredia are dealt with by CENADA (30~35% of domestic circulation is dealt with) that is a public consumer place market. There are three typical types in the circulation of fisheries products in Costa Rica that are local consumption type, domestic circulation type towards the large consumer city of the San Jose circumference and exported type.

In the exported type, there are two cases: one is the case where the brokerage contractors of production places collect the cargos of fishery products and sell them to the exporters, and the other is the case where the exporters may have landing receivers in the places of production and may buy the original fish by the contract with fishery companies. The main suppliers are of Puntarenas, Quepos, Golfito, etc. Although fisheries products may be bought from artisanal fishermen, most of those are bought from contract fishery companies. Mostly the whole quantity of processed fish is exported. The export place is mainly the USA and the companies also deal with the shrimp for Europe. The fresh fish for the USA are put with a keeping cool agent into packing and transported by air, and the frozen products are carried out by vessel. Although the inspections by the quality inspector based on HACCP are undergone from the USA and Europe and the improvement command was received in the past, it has been not taken to an export-ban measure. Moreover, inspection organizations, such as MAG, request to inspect as independence inspection for every arrival of the products, and bacteria, histamine, etc. are inspected.

Table 4. Export and import of fishery products (1999)

	kg	US\$
Total export	35,656,507.00	140,889,771.00
Export via Aduana Santamaria	7,111,457.51	49,823,047.73
Total import*	33,000,000.00	32,000,000.00

* Preliminary

(Informe de Labores 1999-2000, INCOPECSA)

2.2.3.2. Improvement plan of the market circulation

Since producer price is cheap and consumer price is high, CNP (National Products Council) supposes that it is required to reduce brokerage contractors (or their influence), and considers the following policy:

- (a) Build a big wholesale market at Puntarenas. Required expense is 1,200,000 dollars.
- (b) Adjust so that the fishermen may land their catches in the place that CNP specifies in collaboration with the fishery cooperatives of Puntarenas.
- (c) The fishery cooperatives ship to large quantity consumers directly.
- (d) Fishermen open their shops in the market of a weekend.

The market division of INCOPECSA offers technical supports of quality inspection, freshness management, technology, etc. accompanying application of HACCP to CENADA. Moreover, it has a plan to perform a market research by setting it as the main investigation purposes to correct the gap of a producer price and consumer price. This investigation is due for INCOPECSA and the fishery cooperatives to propose, and for CNP to pay expense, and to be conducted in the form commissioned to a private sector board-of-inquiry company.

2.3. Host Country Strategy

The government's position concerning development and sustainable production of the fishery field is specifically shown in the activities plan of INCOPECSA, included in the agriculture-and-livestock development plan with an enforcement period of 1998- 2002. This plan has 37 projects in total, such as 31 projects of economic field, 3 of social field and 3 of environmental field. In the economic field, you can see organization strengthening of INCOPECSA, integration to INFOAGRO of aquaculture statistics, spread of efficient fishery technology, construction of fishery support institutions (Puntarenas, Caldera, Golfito, Quepos, El Coco and Guajiniquil), construction of piers (Tarcoles, Costa de Pajaros, Chomes, Puerto Thiel and Barra del Colorado), fishermen's loan, bank loan support, expense assistance for fuel oil, aquaculture training, systematization promotion of fishery farmers, maintenance of distribution system (system side) and focusing of fishery product quality improvement, HACCP training, spread and support of fishery product quality improvement technology, decision of investigation plan towards private investments, strengthening of investigation system on aquaculture, realization of agreements concerning investigation projects with universities, decision and implementation of investigation plans of aquaculture and the plans concerning technology transfer (PITTA), use research of unintentional captured fish, technology transfer by aquaculture experimental stations, strengthening of seed production (agreement with DRIP or fishermen's organizations), promotion of mariculture (four species) institution installation, etc. In the social field, subscription to fishermen's insurance pension program, social security at the time of the prohibition of fishing by the cooperation with IMAS, etc. and in the environmental field, regulation of fisheries resources development, cooperation with other organizations related to resources environmental conservation, etc. are included.

2.4. Prior and Ongoing Assistance

As main assistance to marine organism field, Germany (personal interchange with Hannover university and its technical support), the Netherlands (joint researches with Wageningen university and Amsterdam university, and funds and equipment supply from the government, etc.), the USA (interchange of foreign students), Japan (technical cooperation to fishing and aquaculture fields), etc. are mentioned. Following six are mentioned as latest main projects that have a relation in the fishery field (Table 5).

Table 5. Assistance from foreign countries

Name of Project		Period	Budget	Country
Development of Aquaculture	Phase I	1989 - 1994	US\$800,000	Netherlands
	Phase II	1994 - 1999	US\$700,000	
	Phase III	2001 - 2003	US\$113,000	
Interchange system of studying abroad		1999-		USA
Piangua culture		1999-2002	US\$10,000	USA
Use of Piangua resource and Ecoturism		2000-2002	US\$20,000	UNDP
Use of oyster and other shellfish resources		2000-2002	US\$20,000	UNDP

3. DEVELOPMENTAL PROBLEMS AND PRESENT CONDITION

3.1. Institutional framework for the sub-sector

3.1.1. National Development Plan

The Costa Rican government is promoting the National Human Resources Development Plan (PNDH, 1998 - 2002) which aims at a sustainable development, harmonizing with environment towards the 21st century. This plan aims at human resources development, therefore, the socio-economical improvement for the purposes of reduction in poverty, creation of better employment opportunities, development of agriculture and local communities, maintenance of industrial infrastructures, improvement of educational opportunities and qualities, environmental protection and appropriate use of natural resources, etc. The Ministry of Environment and Energy (MINAE) has the jurisdiction of the administration concerning conservation of natural environment. Its efforts are directed towards the conservation of these natures, conducting the investigations and researches concerning forests, swamp belts and mangrove areas. The Ministry of Agriculture and Livestock (MAG) decided an agriculture and livestock development plan (1998 - 2002), and the development plan of the fishery field was drawn up as a part of the plan. The fishery development plan is divided into the fields of economy, society and environment, and the concrete execution plan concerning administration, fisheries, infrastructure of aquaculture, etc. is shown in the each field.

3.1.2. Organizations Related to the Subject

Although fishery administration is performed by INCOPECA (Costa Rican Institute of Fisheries and Aquaculture), the investigations and researches about the resources management and the quality control can not be conducted only by INCOPECA because of the problems of institution and human resources. It coordinates with the governmental organs such as MAG, universities or scientific organizations to implement these investigations.

Confusion had arisen because various organizations had so far performed development programs in inconsistent ways in the region of the Gulf of Nicoya over the decades. To harmonize with the environmental conservation and industrial development in the region, the Commission for Development and Conservation of the Gulf of Nicoya (CDCGN) was established in January 2000. This commission is expected to play a great role to development and conservation of the Gulf.

3.2. Developmental Problems and Present Condition

The Gulf of Nicoya located in the central part of the Pacific coast has 1200 square kilometer of the surface area, and its about 100,000 residents are in the coast. About 3,500 artisanal fishermen are fishing in the Gulf and they are fishing mainly with gill net (60%) and angling (29%; handline or longline). The problem that the artisanal fishing is facing for the time being is the aggravation of the fishermen's economical situation caused by the overfishing. As shown below, it is understood from the extremely low fishing level of the Gulf compared with other regions that the balance of fishery production is lost by the overfishing. When a catch per boat (INCOPECA, 1999) is measured, at Puntarenas (The Gulf of Nicoya), there is only 2.7t, below the half of the

other places such as Quepos (8t) and El Coco (29.7t).

The problems that the Gulf of Nicoya is holding are as follow.

- Overfishing and reduction of exploitable resources
- Contamination from valley waters and also from agrochemicals
- Shortage of alternative industries
- Quality of deteriorated fishery products
- Blooming of the alga as a result of the contamination

The workshop by the PCM method was held September 4 to7, 2001 to clarify these problems more and to materialize the range and the contents of cooperation by about 30 participants (persons concerning the Gulf of Nicoya, UNA, INCOPECA, INA and other organs concerned). The main topic was "Household income of artisanal fishermen is not good". Problems were identified and analyzed with the results set out in the following paragraphs.

3.2.1. Problem in Employment

• Shortage of alternative employment

Although tourism, aquaculture or fishery processing can be considered as alternative industry, there is not attractive things to tourists in the Gulf of Nicoya, marine fish culture in net-cages that artisanal fishermen can conduct does not exist because of the lack of technology and institution to produce a lot of fish seeds necessary to the net-cage culture, and familial fishery processing does not exist for the reason that the people have little custom to eat marine products.

3.2.2. Problem in Shellfish Extraction

• Prohibition of shellfish extraction

The extraction of shellfish has been forbidden since red tide generated in a large quantity at the end of 2000, when poisoning took place to the fishermen who ate the extracted bivalves and some were dead. The damage situation by the latest poisoning is as follows: 2 children were dead in 1972, 9 persons were poisoned including one dead in 1989 and 54 persons were poisoned during November 2000 to October 2001.

3.2.3. Problems in Fishery Production

The reduction in the production of fishes and shellfishes is based on reduction of the fisheries resources by overfishing and the following problems are mentioned as the cause.

• Increase of fishermen

Since the international price of the banana and coffee which are the main export agricultural products in the country has slumped while intensive agriculture progresses (EIU-The Economist Intelligence Unit and Country Profile 2001), there are many people who convert from agriculture to fishery, and fishing population is increasing as a result.

Illegal fishermen

The appearance of illegal fishermen may be inevitable, since the fishermen are increasing in number as mentioned above although the number of fishery permissions is restricted. According to the fishery census of the year 2000 and the investigation in 2001 performed by the protection and registration office of INCOPECA, the numbers of fishery permissions and illegal fishermen are as follow.

- (1) The fishermen possessing a fishing license with a boat less than 10m in length are 1478.
- (2) The number of communities where the above-mentioned fishery permission is issued in the coast of the Gulf of Nicoya is 33.
- (3) The number of fishing boat distributions is 44.78 boats in village average. Puntarenas has 382 boats as the maximum and Cedro has 1 boat as the minimum.
- (4) The number of illegal fishermen who are performing the fishing in the Gulf without acquiring fishery permission, which became clear by the investigation in 2001, is as in Table 6.

Table 6. Number of illegal fishermen in the Gulf of Nicoya (2001)

Communities	No.	Communities	No.	Communities	No.
Isla Caballo	31	Cabo Blanco-Jicaral	12	Cabuya	9
Chacarita	56	Isla de Chira	83	Chomes	29
Cocorocas	12	Colorado	34	Corozal	8
Costa de Pajaros	75	Jicaral	24	Lepanto	22
Mal Pais	6	Manzanillo	52	Cobano	5
Mata Limon	12	Morales	21	Paquera	9
Playa Blanca	17	Pochote	19	Tambor	15
Pto. Jesus	10	Pto. Moreno	20	Pto. Nispero	7
Pto. San Pablo	22	Pto. Thiel	20	Puntarenas	34
San Buenas	13	Tarcoles	20	Isla Venado	69
Total					788

INCOPECA, DGT-254-01 (MSc. Ricardo Gutierrez Vargas)

Incidentally, in fishery permission, there are the permission to a fishing boat and the permission to a fishing method, and they are as follows.

(1) Permission to fishing boats (licencia)

As for the term of validity of fishery permission, most will be updated in one year. The permission number of small ships operating less than 3 nautical miles is about 1,800 in the whole country.

(2) Permission to fishing methods (permiso)

The permission system according to fishing method is independently provided in the fishery rule of the Gulf of Nicoya (AJDI - 87-96) to the artisanal fishing in an

inner bay and a center bay. This divides the fishing methods in three classifications such as shrimp gill net, fish gill net and angling & others. The number of permission issued is up to 700.

- Unobserved fishery rule

It seems that some fishermen are not following a fishery rule but operating by necessity since the number of fishery permissions is restricted as mentioned above and the number of permissions given to other fishermen is restricted because of existing fishermen with two or more licenses.

- Problems in the fishing methods

- Actual fishing law No.190 was made in Sep. 28, 1948. Then, the bill of the new fishing law that made it the main point to carry out expansion and strengthening of the authority of INCOPECSA was presented in September 1998, and it passed the first council in 2000. If this bill is enacted, an illegal fishing method can be controlled.
- It is difficult to perform the fishing by appropriate fishing methods since there is not enough capability to investigate fishing amounts of existing fishery products and the researches on other exploitable fish stock are insufficient due to lack of the monitoring or resources evaluation according to fish stock.

- Overfishing of small fishes

Since there are problems in fishing methods as mentioned above, the small fishes on the way to resources recruitment are captured unintentionally.

- Pollution in the Gulf of Nicoya

In the Gulf of Nicoya, there are the Tempisque river that opens its mouth to the Gulf and the Tarcoles river that has the Central Valley as a river valley. The former has the valley area of 5,535km² and is the largest one of the rivers flowing into the Gulf. At the valley area of the river, crops such as rice and sugarcane are cultivated and it is said that a chemical fertilizer and agricultural chemicals flow into the river in large quantities. Moreover, from tilapia culture being performed, there seems to be also a problem of culture drainage. The Tarcoles river has the valley of 2,275 km², is in the valley where industrial development is going most in Costa Rica, is the river where contamination is going most, and is flowing into the head part of the Gulf of Nicoya. 80% of the industry, 70% of the population and 80% of coffee beans processing are concentrating on the Central Valley, and these drainage flows in. Although a mitigation tendency has the drainage by these industries by circulation use etc., recently, it is said that drainage from the household is the severest and it is in an effluence state (about 20% of sewer maintenance). Moreover, although the valley area is 565km² as less than these 2 rivers, since the Barranca river that has its mouth in the Puntarenas coast passes along a steep geographical feature, it has much inflow of earth and sand. There is also superfluous development of land, a lot of earth and sand flow in at the rainy

season, and the color of an inflow part changes to brown clearly in the Gulf.

- Felling of mangrove

The Gulf of Nicoya is located in a largest mouth area of tropical rivers in Central America (1530km²). The surrounding mangrove has only 1% of the surface area of the Gulf of Nicoya, it is however contributes to 76% of the biomass living there (Wolff and M. et al.1998). Although the mangrove had been cut down and the shrimp farm had been developed in the mangrove area before the statute was made, not only felling but also use of the mangrove is then forbidden besides of research activities by scientific researchers.

3.2.4. Low Price of Fisheries Products

- Low quality of fisheries products

Since the fishermen do not have much the knowledge on the life span of the products and there are not quality standards, they do not handle fisheries products with much care, and as a result the quality of the fisheries products are bad. When the fishermen are carrying out the longline fishing for snappers or drum fishes and the handline fishing of a barracuda in the Gulf, they do not load ice in the boats and leave the caught fishes on the deck or throw into a fish hold. When they perform gill net fishing or longline fishing during about 2 days out of the Gulf, they load ice in the fishing boat and put the caught fishes into the fish hold containing ice. Nevertheless, since they do not mind so much the quality of the captured products, freshness falls considerably when being landed by the harbor. It is said that 20 - 40% of the fishes fished by the artisanal fishermen do not actually become goods.

- Increase of supply from the outside of the Gulf

Table 7 represents the landing amount by the artisanal fishery classified by area of the Pacific coast. The amount of landing to Puntarenas is increasing as a whole with the background that the landing amount is increasing as a result of the increase of the fishermen who go to fish out of the Gulf because the fishing inside the Gulf is dull.

Table 7. Landing amount by artisanal fishery (Pacific coast) (MT)

Fishing Region	1997	1998	1999*
El Coco	10,080 (56.6%)	8,011 (53.1%)	8,173 (51.7%)
Puntarenas	2,584 (14.5%)	3,423 (22.7%)	4,348 (27.5%)
Quepos	2,878 (16.2%)	1,866 (12.4%)	1,924 (12.2%)
Golfito	2,263 (12.7%)	1,787 (11.8%)	1,364 (8.6%)
Total	17,805 (100.0%)	15,087 (100.0%)	15,809 (100.0%)

*Preliminary

(Informe de Labores 1999 - 2000, INCOPECSA)

Landings in Puntarenas are increased mainly because of products coming from oceanic waters (Dolphin fish, sharks, marlines, etc.), while the fish catch in the Gulf is decreasing on the contrary.

- Price set freely by middle contractors
 Since there is no transparency of a market and there is no rule when determining prices, the middle contractors have bought the fisheries products at very low prices from the fishermen. According to the middle contractors, since the fisheries products from the artisanal fishermen do not have freshness, the purchase price becomes cheap. It is generally said that there is an about 2-time difference between the place-of-production price and consumer place price of fisheries products.
- Insufficient variety in fisheries products
 In Costa Rica, the processing fisheries products have only the frozen fillet of fishes, canned food and a salt-dried products besides frozen shrimps, frozen spiny lobster or fresh products. Most of them are for export. Since the people of Costa Rica do not have much custom of eating fisheries products and there is no custom to process fisheries products, the diversity of fish and shellfishes is scarce after all.
- High cost of fishing operation and maintenance
 The fishermen who sail out to fish outside the Gulf are increasing in number because the catch in the Gulf has hung low. According that the fishing ground becomes farther, fuel cost increases and accidents such as a breakage of fishing gear and a spill increase unlike the inside of the Gulf as well as the maintenance cost. The fishing ground being farther every year, it takes now no less than eight days to attain the amount of landing lifted in three days before
- Small quantity of fish consumption per capita
 In Costa Rica, consumption of meats of animals is high as a source of animal protein, and there is very little consumption of fisheries products. The amount of fish consumption per capita is 4.2kg/year (Rodriguez, J.A.1999).

4. PROJECT STRATEGY

4.1. Overall Strategy

The fishing amount decreased as the reduction of the resources due to the overfishing. The overfishing was caused by the increase in fisherman's population, and resulted that the fisherman's income was decreasing. When the problems analysis was carried out, it became clear that various problems were contained. In order to show clearly what approach there is to conquer those problems and which approach is more effective to implement actually the project, the following objectives analysis was performed. Then, the selection of approach was performed so that it might align with the government plan of the fishery field and finally the project was determined. The core objective of the objectives analysis was presupposed that "Artisanal fishermen's household incomes go up", and the objectives analysis were performed about the following six items.

4.1.1. Alternative Industry for Artisanal Fishermen

It is thought that the mariculture could be as one of the alternative industries that the artisanal fishermen can conduct, and the analysis for the artisanal fishermen to practice the mariculture was performed.

- Technological transfer on mariculture

Culture technology is developed, model culture is performed, the experts for technological transfer to train instructors, and culture technology is transferred to fishermen.

- Supply of seeds

It is fishes, oyster and scallop what are considered as the object organisms for mariculture that the artisanal fishermen can perform. While the supply of seeds is required to perform these cultures and the seed production techniques for them are developed, seed production institutions need to be prepared.

- Finance by trust fund

Since the fund of the equipment and material purchase for starting culture is required, a financing system needs to be prepared.

- Permission to sea area use

While the permission on the use of the sea area according to each culture form is fixed, an environmental impact assessment needs to be performed.

- Organization for mariculture

It is more convenient to work as an organization rather than that all are performed individually for the purchases of equipment, materials and feed, sales of products, exchange of information, etc.

4.1.2. Shellfish Extraction by Artisanal Fishermen

As for the shellfish extraction being forbidden, generating of red tide is considered to be the cause. Therefore, it is said that the shellfish extraction is made if the

mitigation and management of the impact of red tide can be performed.

- Regulation of shellfish extraction

Quality is guaranteed by determining the toxic grade of bivalves. By doing biological study and physiochemical research of red tide plankton, the knowledge about the toxic red tide increases and prediction capability is trained. Water quality monitoring is performed periodically.

At the present, there is a system of analysis as follows when the red tide generates extensively in Costa Rica:

- INCOPECSA extracts shellfish in the area and carries them into MAG.
- MAG analyzes the toxicity of the shellfish.
- UNA analyzes water samples to determine concentration of harmful algae and to identify species.
- The analysis result is sent to the Costa Rica Red Tide Surveillance Committee.
- When the toxic value is over the standard point (4 UR/g), it is judged that the shellfish is toxic, and it is reported to the Ministry of Health and Welfare.
- The Ministry of Health and Welfare advises to forbid the shellfish extraction to this committee based on this report.
- This committee orders carrying out the prohibition of shellfish extraction to INCOPECSA according to the advice.

- Implementation of the program for preventing the influence of red tide

Education to the people and training to the persons concerning the health are performed.

- Reduction of bivalve's toxic level

Solving the detoxification mechanisms of bivalves reduces the toxic level.

4.1.3. Increase of fishing amount

In order for the fishing amount to increase, the amount of fisheries resources needs to be recovered, and for that, the following items become important.

- Appropriate fisherman's population

Evaluation of resources on the products fished and the products with the potential of effective use is performed, and a resources management plan is decided by a cooperative work of concerned organizations. Updating fishery regulation based on this plan and if a certain job creation occurs simultaneously on the coast, fisherman's population will become a proper level. The Gulf of Nicoya development and conservation committee to which 17 organs are belonging has started activities since April 2000. Since the keynote of this committee about the resources is that "the committee decides the continuous evaluation plan of the populations of fisheries resources and the mariculture plan, and performs area studies with fishery communities towards the fishing dispute mediation

accompanying the overexploitation of resources ", it plays a very important role.

- Fishing gears used to improve fisheries sustainability
Regulations and surveillance are strengthened so that fishermen use only gillnets no longer than 300 m with a mesh size equal or larger than 3 inches, and longlines with no more than 250 hooks of number 7 or larger.
- Comprehension of the resources management concept
When the educational training of resources conservation spreads, the fishermen understand the resources management concept.
- Implementation of the fisheries resources management
New fisheries law will allow INCOPESCA to apply, in the near future, fisheries resources management plans not only for the fishing activity but also for marine aquaculture.

4.1.4. Increase of the prices of fisheries products

- Supply of fisheries products with a good quality and a safety
Fish and fish-based products of good quality are obtained through application of a new technology that is transferred by training national counterparts, who spread the technology. And it is transmitted from these people to local fishermen. Simultaneously, quality controls are performed and standards of quality are settled as the result of research and dialog with fishermen.
- High price of fisheries products with a good quality
When the education to the consumers is performed by advertisements, lectures, workshops, etc., the reliability of fisheries products goes up and the products of a good quality are bought with a high price, at the same time the strict observance of a quality control is checked.

4.1.5. Sales increase of fisheries products

- Supply management
- Direct sales to consumers
The opaque determination of a landing price becomes clear.
- Increase in consumption of fisheries products
Habit of eating more fish of good quality as well as processed products is developed in Costa Rican people. This will be carried out by training local people in different technologies for products manufacturing and also by using massive media like radio and TV.

4.2. Project Strategy

4.2.1. Selection of project

The possibility of the activity about four fields (resources management approach,

quality control approach, red tide and shellfish toxin approach, aquaculture approach) was checked as a result of the objectives analysis. Based on the comparison and evaluation table (separate attachment), a comparison of these approaches was performed on the importance, the number of beneficial candidates, the achievement possibility of the project target and the field of impact. The results of the comparison are as follow:

- (1) Resources management approach: All participants agreed that its importance is high.
- (2) Quality control approach: A relative priority is high.
- (3) Red tide and shellfish toxin approach: The beneficial candidates are limited to the shellfish extraction fishermen, although it is important.
- (4) Aquaculture approach: The beneficial candidates are limited to a small number and first of all the feasibility study including the selection of species cultured etc. is necessary.

As a result of talking being based on the above result and the priority of Costa Rica, two fields of (1) resources management approach and (2) quality-control approach (the analysis for checking the safety of food etc. is included) were unified, and it was decided that the project aiming at building the sustainable fishery system of Gulf of Nicoya is carried out for through technology transfer of resources management and quality control fields.

5. PROJECT IMPLEMENTATION STRUCTURE

Universidad Nacional requested the project to Japanese government but its implementation can be possible only with the direct and active participation of INCOPECSA. Since CDCGN plays the important role for adjustment or cooperation of various organizations it became a member of the joint coordinating committee and the steering committee of the project.

5.1. Capability of Counterpart Organizations

The counterpart organizations consist of two organizations: UNA and INCOPECSA. In addition, since the project was request by UNA, the participation of INCOPECSA as a counterpart organization is based on an agreement with UNA.

(1) UNA

On the university level, CIMAR (Sea and Lake Research Center) of UCR (Costa Rica University) and EBM (Marine Biology Station) in the Biological Sciences School of UNA are performing the research and the education about the fishery field. EBM is carrying out education focusing on applicable research in cooperation with the fishery and navigation training center of INA (Vocational training school) and INCOPECSA, while CIMAR tends to concentrate on basic research of the marine science. Some JICA experts and many JOCV (Japan Overseas Cooperation Volunteers) have been dispatched to EBM, and it is well versed in the technical cooperation of JICA.

(2) INCOPECSA

INCOPECSA is the executive organ of fisheries and aquaculture administration, and its participation in the project is indispensable in order to attain the project purpose "construction of a sustainable fishery system" through technology transfer of a quality control and resources management.

5.2. Outline of Counterpart Organizations

5.2.1. EBM

5.2.1.1. Outline of EBM

EBM is the seaside experimental station of the Biological Sciences School (Escuela de Ciencias Biologicas), College of Exacts and Natural Sciences (Facultad de Ciencias Exactas y Naturales) of UNA, and the main building was established in Puntarenas by Costa Rican specific funds: PL480 and Fishery Law. The organization chart of the natural science department is as shown in a separate attachment. Nine laboratories in two sections of coastal management (Manejo Costero) and mariculture (Cultivo Marino) constitute EBM (organization chart, separate attachment). There are seven persons as permanent resident instructors and eight permanently non-residing instructors (dispatched from UNA during two days a week), in addition one instructor under studying abroad in Mexico. Moreover, the support staffs of EBM are four assistants, four guards of 24-hour shift, one secretary, and one cleaning member. Each laboratory and the instructor in charge are as in Table 8.

Table 8 (1). Laboratories and instructors in charge of Coastal Management (July, 2002)

Laboratory	Permanent instructor	Non-permanent Instructor
Phyto-plankton	Lic. Emilia Calvo Vargas (Red tide)	MSc. Roxana Viquez (Marine botany)
Quality Control	Lic. Cristian Fonseca (Quality control)	Lic. Hernan Vargas (Microbiology)
Fisheries Research	Lic. Jose Palacios (Fishery evaluation)	MSc. Rigoberto Viquez (Fisheries)
	Lic. Alberto Villarreal (Fishing methods)	Dr. Luis Sierra (Ichthyology)
	Lic. Rosa Soto Rojas (Fishery biology)	
Computer Science for Fisheries	Lic. Gerardo Zuñiga	

Table 8 (2). Laboratories and instructors in charge of Mariculture (July, 2002)

Laboratory	Permanent instructor	Non-permanent Instructor
Water Quality	An instructor from Chemistry field	Dr. Ricardo Jimenez (Water quality)
Shrimp Culture	Dr. Jorge Alfaro (Shrimp culture)	Lic. Nazira Galvez (Aquaculture)
Shellfish Culture	Lic. Gerardo Zuñiga (Aquaculture)	Lic. Rafael A. Cruz (Malacology)
Plankton Culture	Lic. Sidey Arias (Aquaculture)	
Fish Culture	MSc. Jorge Boza (Aquaculture)	
Fishery Extension	MSc. Luis Villalobos	

Attn. : MBA. Angel Herrera (Natural resource management) is studying abroad in Mexico.

MSc. Farid Tabash (Computer Science for Fisheries) is studying abroad in Chile.

5.2.1.2. Counterpart Allocation

Instructors designated as expert's counterparts for the quality control and resource management are listed in table 9. In addition, since they all are residing at EBM permanently, they should teach at least ¼ of their total office time, so the remaining ¾ will be given to the project.

Table 9. Counterparts for the experts (UNA)

Field	Counterpart candidates
Quality control	Chief Lic. Cristian Fonseca (Quality control) Lic. Emilia Calvo Vargas (Red tide and Shellfish toxins) Lic. Hernan Vargas Barrantes (Microbiology) An instructor from Chemistry field
Resources management	Chief Lic. Jose A. Palacios (Fishery evaluation) Lic. Rosa Soto Rojas (Fishery biology) Lic. Alberto Villarreal (Fishing methods) MSc. Rigoberto Viquez (Fisheries) MSc. Luis Villalobos (Fishery extension) MBA. Angel Herrera (Resource management: studying abroad) MSc. Farid Tabash (Fishery evaluation: studying abroad)

5.2.1.3. Budget of EBM

The budget of EBM is as follows:

- Validity of the budget is one year by January 1 to December 31.
- It is applied in August of the previous year.
- Immediately after determining it, it is transferred to a bank.
- And it can be outlaid on January 1.

Annual budget of EBM is about 140,000,000 colons in average. Table 10 shows the prospective budget for execution of the project for 5 years.

Table 10. Prospective budget for excution of the project for 5 years (EBM)

(Unit US\$)

Item	I	II	III	IV	V
(1)Personel	64,200	64,200	64,200	64,200	64,200
(2)Basic Services	2,500	2,500	2,500	2,500	2,500
(3)Travel	3,580	3,580	3,580	3,580	3,580
(4)Transportation Equipment	7,500	7,500	7,500	7,500	7,500
(5)Field and Laboratory supplies	3,000	3,000	3,000	3,000	3,000
(6)Rental expenses	4,285	4,285	4,285	4,285	4,285
(7)Facility expenses	24,000	24,000	24,000	24,000	24,000
(8)Field & laboratory equipment	41,600	41,600	41,600	41,600	41,600
Subtotal	150,665	150,665	150,665	150,665	150,665
Total	753,325				

Notes:

- (1) Personnel: 4 full time counterparts and one full time secretary
- (2) Basic services: Electricity, water, Internet, telephone, library, security, fax.
- (3) Travel: Travel allowances within the country
- (4) Transport equipment: Operation and maintenance expenses of vessels and vehicles (Fuel, oil, insurances, spare parts, depreciation).
- (5) Field and Laboratory Supplies: Reagents, stationary and other materials
- (6) Rental Expenses: boats.
- (7) Facility Expenses: office and space
- (8) Field and Laboratory Equipment

5.2.1.4. Records of Investigations and Researches

The research projects that EBM is advancing now are:

- Shellfish toxins monitoring by red tide
- Net-cage culture of shrimps (*Penaeus* spp.)
- Shellfish culture
- Snapper culture
- Shellfish culture including Piangua (*Anadara tuberculosa*, a species of bivalves which inhabits a mangrove)
- Freshness maintenance (HACCP related research is included) of fisheries products
- Ecotrophic model development

- Population dynamics of important species
- Development research of fishing gears for fishing selectivity
- Research of crab meat canned processing with a swimming crab *Callinectes arcuatus*
- Research of the biodiversity of the Pacific coast

The main investigations and researches that UNA/EBM did until now are as follow.

- Prospect of Oyster Farming in the Gulf of Nicoya
- Growth Comparison of Serranidae species in the net-cage culture in Pacific Coast
- Studies on the ecosystem in the Gulf of Nicoya
- Polyculture of shrimp (*Penaeus* sp.) and Tilapia
- Growth of snapper juveniles (*Lutjanus guttatus*) with particle feed in the environment of laboratory aquarium
- Consideration on the biota of Engraulidae species (*Cetengraulis mysticetus*) in the Gulf of Nicoya
- Presumption of the biological fishing parameters of snapper *Lutjanus guttatus* in the Gulf of Nicoya
- Studies on reproduction management of marine shrimps
- Pre-analysis on the existence of agrochemicals in coastal waters and its impact to the environment
- Research on the present and future of the fisheries resources
- The role of research and extension in shrimp fisheries
- Impact of the net-cage mariculture on the environment
- Fishery village development in the Gulf of Nicoya
- Influence of the fishery sector on Costa Rican society and on the resources
- Influence of coastal waters on the Gulf of Nicoya Ecosystem
- Socio-economic status of the population of the Gulf of Nicoya
- Historical perspective about agricultural land of the Gulf of Nicoya
- Fishermen's organization of Jicaral Village
- Artisanal fishermen's organization (COLOPES) and extension to the fishery sector in the Gulf of Nicoya
- Preliminary plan for regulation of shrimp fishery in the Gulf of Nicoya
- Assessment of red tide and toxin accumulation in the Gulf of Nicoya
- Population dynamics of *Opisthonema* sp
- Catch and yields using artisanal long line in the Gulf of Nicoya

5.2.2. INCOPECA

5.2.2.1. Outline of INCOPECA

INCOPECA is the government organization in charge of regulating the fishery and marine aquaculture in Costa Rica. It became a semi-autonomous organization in 1994 by law 7384. It is constituted by three Divisions: Technical, Fishermen and Aquaculture Organization, and Administration. The highest authority is the Executive President who is at the same time the President of the Directive Board and is designated by the President of the Republic (Table 11). There are about 120 persons

working in INCOPESCA in total.

Table 11. Role of each division of INCOPESCA

Division	Site	Composition of Personnel	Contents of working
Administration	Puntarenas	10%	· Administration
Technical	Puntarenas and others	75%	· Fishery permission · Fishery investigation · Statistics · Aquaculture
Fishery and Aquaculture Organization	San Jose and Puntarenas	15%	· Fishermen and aquaculturist organizations · Promotion of fishery enterprises · Marketing · Quality control · Environmental control

Distribution of local offices and Divisions are as follows: Guanacaste Regional Division (Depends directly on the President), Limón Regional Division (Depends directly on the President). Puntarenas, Quepos and Golfito offices (Depends on Technical Division), Aquaculture department including 4 freshwater research stations at San Carlos, Guápiles, Cañas y Cerro de la Muerte; Research and Statistics departments (Depends on Technical Division).

Marketing, Environmental and marine products quality control Departments (Depends on Fishery and Aquaculture Organization Division)

Human Resources, Computing and Financial departments (depends on Administrative Division)

5.2.2.2. Counterpart Allocation

The counterparts are as follow:

Table 12. Counterparts for the experts (INCOPESCA)

Field	Counterpart
Fisheries policy	Lic. Antonio Porras Porras (Fisheries policy)
Quality control	Dr. Rolando Ramirez Villalobos (Marketing and Quality control) Ing. Giselle Blanco Venegas (Quality control) Lic. Cecilia Soto Monge (Quality control)
Resources management	Lic. Hubert Araya Umaña (Resources management) Prof. Adan Chacon (Statistics) Lic. Berny Marin (Environmental control)

5.2.2.3. Budget

The budget of INCOPESCA is mostly constant every year and the amount is 750 million colons. In addition to administrative expenses, working expenses are also contained in this. Since personnel expenses are rising, working expenses are tightening. For example, although fishery and aquaculture statistics used to be published monthly, with the cut of working expenses, it became twice per year last year, and becomes once a year this year. INCOPESCA estimates the budget for the project that could be offered as follows:

Table 13. Prospective budget for execution of the project for 5 years (INCOPESCA)
(Unit US\$)

Item	I	II	III	IV	V
(1)Personel	67,200	67,200	67,200	67,200	67,200
(2)Basic Services	450	450	450	450	450
(3)Travel	8,000	8,000	8,000	8,000	8,000
(4)Transportation Equipment	14,500	14,500	14,500	14,500	14,500
(5)Field and Laboratory supplies	100	100	100	100	100
(6)Rental expenses					
(7)Facility expenses	20,000	20,000	20,000	20,000	20,000
(8)Field & laboratory equipment					
Subtotal	110,250	110,250	110,250	110,250	110,250
Total	551,250				

NOTES:

- (1) Personnel: 2 full time counterparts and 6 part time counterparts.
- (2) Basic services: Electricity, water, Internet, telephone, library, security, fax.
- (3) Travel: Travel allowances within the country
- (4) Transport equipment: Operation and maintenance expenses of vessels and vehicles
(Fuel, oil, insurances, spare parts, depreciation).
- (5) Field and Laboratory Supplies: Reagents, stationary and other materials
- (6) Rental Expenses: boats.
- (7) Facility Expenses: office and space
- (8) Field and Laboratory Equipment

5.3. Cooperation System with Other Organs

5.3.1. Cooperation with CDCGN

In order to make more effective this plan, it should be integrated not only with public but with private organizations, that is why the Gulf of Nicoya Development and Conservation Committee (Commission para el Desarrollo y Conservación del Golfo de Nicoya: CDCGN) is the ideal linkage with the Community. This Committee was created in year 2000 and it is formed by the most relevant organizations (Table 14).

Table 14. Participating organs and organizations to CDCGN.

	Organs and organizations
Academic group	UNA, UCR
Governmental organs	Presidential Ministry, MIDEPLAN, MAG, MINAE, Public Health Ministry, INCOPECA, IMAS, ICT
Local authority	Municipality of Puntarenas, Guanacaste Municipal Union
Private sector's and local organizations	Costa de Pajaros Fishermen Association, Puntarenas Tourism Association, Gulf of Nicoya Environmental Conservation Association, Barrio El Carmen Development Association, ASOTEMPISQUE

The fundamental target of this committee is summarized below:

- Adjust the resources and the opinions of participating organizations and related sectors such as the government, fishery communities, producers, environmental conservationist organizations, local authorities, etc.
- Unify the plans which participating organizations have and decide upon the final target of an area. In the case of participating organizations, it is necessary to pass through each decision-making of each plan.
- Analysis and advice of a typical organization are required for the acceptance and evaluation for carrying out a business plan.
- Promote formation of the common strategy of participating organizations and related sectors for the decision of a business plan and implementation.
- In addition to the role of the above adjustments, take part in the examination of the research, analysis and solution method on the future and the present problems that generate in the Gulf of Nicoya.
- Negotiate with the foreign governments and the assistance organizations that help to the decision and implementation of business plans.

5.3.2. Support System in Japan

Establishment of the domestic advisory committee is planned. The committee's main role is that examination of training curricula, advices about equipment selection, support of making teaching materials, advices to Japanese experts about project management and instruction.

5.4. Sustainability after the End of the Project

Because of the evident decreasing tendency of the Gulf resources, artisanal fishermen believe that they have to participate more actively in the management process of the Gulf resources.

Judging from experiences of the counterpart candidates from both institutions, it is expected that once the project is concluded and therefore the technology is transferred, national professionals could achieve further technical developments on a sustainable basis.

5.5. Special Consideration

This project is taking up the resources management and the quality control for the purpose of construction of a sustainable fisheries system. However, since the environmental pollution is considered one of the big factors of resources reduction, it is important to educate the fishermen how the effluence of drainage from the household and the sea dumping of garbage pollute the sea. Moreover, it is important to conduct main activities related to fish-eating habits, such as cooking methods, in fishing villages. Since this project cannot respond to such activities, it seems to be necessary to consider the involvement of NGO.

6. PROJECT DESIGN

6.1. Super Goal

The super goal of the project is set out as "Household incomes of artisanal fishermen are improved". Passing several years after "Construction of a sustainable fisheries system" which is the project purpose, "Sustainable fisheries are performed" which is the overall goal, and when this state continues further, household incomes of artisanal fishermen will be improved.

6.2. Overall Goal

The overall goal is set out as "Sustainable fisheries are performed". The sustainable fisheries point out the state that the governmental agency INCOPECA manages appropriately and strictly the restriction of the number of fishery permissions, the limitation of fishery permission period, regulation of fishing gears and fishing methods, etc., and many of fishermen are accepting these regulations without breaking them. The sustainable fisheries is considered as the state that the activities of fishery regulation, resources consciousness education, etc. are positively performed several years after "Construction of a sustainable fishery system" which is the project purpose.

6.3. Project Purpose

The project purpose is set out as "Construction of a sustainable fishery system". A fishery system needs to be built in order for each organization to work according to each duty aiming at sustainable fisheries. The result about the quality control is a measure to the impact of fishing amount reduction in the fisheries management plan, and is thought that it contributes to construction of a sustainable fishery system.

6.4. Outputs

For "Construction of a sustainable fishery system" which is the project purpose, six means were chosen and set up as the outputs: (1) to (3) are concerning the fisheries resources management plan. Since it was considered important to not only decide but also advance the enforcement and updating the plan in the project, and about five years are required for decision, implementation and updating to take a round, the plan was classified in three parts. (4) to (6) are about the quality control. The outputs on the technical development and technical spread in a fishermen's level, the improvement in a quality control in a circulation stage, and consciousness education of a consumer were chosen and set up. They aim at preparing the system that transmits quality control technology and its concept in five years.

(1) A fisheries resources management plan is drawn up appropriately

A plan is decided by the result of talking in the related organs in cooperation with the CDCGN, based on the basic data obtained through the fact-finding survey of fisheries and resources evaluation of fish species.

(2) The fisheries resources management plan is appropriately implemented

It is considered of fundamental importance that fishermen know and understand the concept of resources management in the short, medium and long terms. INCOPECA

needs to take charge of implementation of the supervision with consideration of the plan as a security towards overall goal achievement after the end of the project, and the National Police Agency needs to control exactly further.

(3) The fisheries resources management plan is periodically updated

After the fisheries resources management plan is carried out, the plan is updated by conducting the monitoring of fishing activities and the fisheries resources, investigating the implementation situation of the plan, and deliberating upon the revision of the plan in the organs concerned.

(4) A safety improvement policy of shellfishes is drawn up

This policy will be ready by proposing some counter measures after the investigations on the contamination of the Gulf of Nicoya and the present condition of shellfish toxin accumulation.

(5) A freshness improvement policy of fisheries products is spread

The policy is considered by the investigation on the present condition of the freshness, the examination of improvement fishing methods, etc. Furthermore, the quality control concept is well known by artisanal fishermen, and the improvement situation is investigated. Moreover, the technology and the concept spread by performing the quality control instruction in fishing villages. Especially, effective use of the products discarded (20 - 30% of captured products) is considered. In the quality control approach, the activities about this output are considered to be the central domain of the project.

(6) The freshness improvement policy of fisheries products in a circulation stage is spread

Although this project was not set to aim the improvement in quality control for the distribution industry, it has the intention of guiding distributors for them to ask artisanal fishermen better quality products that probably will receive higher prices.

6.5. Activities

In order to attain the outputs (1)-(6) mentioned above, the following activities were chosen and set up. It is very difficult that the fishermen are permeated completely with the resources management concept and the quality control within 5 years of the project period. Therefore, the osmosis should be promoted over much time in cooperation with INA (National occupation training school), etc. after the end of the project.

1-1 Elaborate the plan of activities

1-2 Understand the actual condition of fisheries

- 1-2-1 Investigate landing situations (size, species, seasonal variation)
- 1-2-2 Investigate fishing gears and methods
- 1-2-3 Examine fishing gear selectivity and environmental impact
- 1-2-4 Evaluate new fishing methods
- 1-2-5 Investigate the structures of fishery communities

As the actual condition of fisheries, investigations on landing situations, fishing gears and methods, etc. are conducted, and then examinations of fishing gear selectivity and environmental impact are performed. Moreover, in fishery community structure investigation, the fishermen's life situation and the consciousness to the resources management concept, the prediction of the impact accompanying restriction of fishery permission, a gender problem, an educational level, etc. are investigated.

1-3 Evaluate the resources of fishing species and exploitable species

1-3-1 Fix landing statistics

1-3-2 Conduct ecological investigation of species utilized and exploitable species

1-3-3 Examine the biology and reproduction forms

1-3-4 Build a database of resources evaluation

1-3-5 Evaluate the resources of species utilized and exploitable species

These activities are performed on the basis of the results of the survey on the actual condition of fisheries.

1-4 Elaborate the plan of resources management

1-5 Discuss on the plan in the organs concerned

1-5-1 Check the plan

1-5-2 Coordinate with other organizations concerned through the cooperation with CDCGN

The plan is checked after resources evaluation in the organs concerned. The project cooperates with CDCGN so that the plan would be discussed and drawn up more effectively.

2-1 Make it well-known to the fishermen the resources management concept

2-1-1 Create educational materials

2-1-2 Promote fishermen's organization

2-1-3 Hold workshops for fishermen

When the resources management concept is well known to the fishermen, the plan becomes more effective. The common knowledge consists of teaching materials creation, workshops to fishermen and promotion to fishermen's organization. In a workshop, it is desirable to conduct a simple questionnaire survey on consciousness just before and after the seminar because of monitoring. About the activities on promotion to fishermen's organizations, the activities should not be one-sided education but be considered as mutual education activities with the exchange of resources management information. In addition, it is necessary to create the teaching materials and to hold the workshop to the fishermen in consideration of their literacy.

2-2 Manage the artisanal fishery organizations

2-2-1 Watch the activities of the illegal fishery

2-2-2 Design and suggest the supporting system for the fishermen

3-1 Monitor fishing activities

The monitoring of the changes in the fishing activities accompanying implementation of the plan is carried out every year.

3-2 Monitor fisheries resources

With the above monitoring, the monitoring of the resources situation is also carried out periodically.

3-3 Investigate the enforcement situation of the plan

The spread situation of the resources management concept to the fishermen and the motions of related organizations are investigated as the middle evaluation.

3-4 Discuss on the revision of the plan in the organs concerned

Based on the monitoring and the results of the middle evaluation, the revision of the plan is deliberated in the organs concerned, and the plan is updated. In addition, it is desirable to update the plan by the frequency of 1 time in 2 - 3 years after the creation of the plan.

4-1 Grasp the present condition of shellfish contamination and toxin accumulation

4-1-1 Fix the data of the past

4-1-2 Analyze the contaminants of shellfishes

4-1-3 Analyze the shellfish toxins caused by red tide

By arranging the data of the past on the related fields and analyzing about shellfish toxins caused by red tide and the contaminants of shellfishes, the present condition of shellfish contamination or toxin accumulation is understood.

4-2 Propose solutions about shellfish contamination and toxin accumulation

4-2-1 Monitor shellfish contamination and toxin accumulation

4-2-2 Transmit the results of monitoring and the countermeasures to the organs concerned

Based on the present condition of shellfish contamination and toxin accumulation, the monitoring is carried out, and it is transmitted to the organs concerned by considering the results and countermeasures as a proposal.

5-1 Consider the freshness improvement policy of fisheries products

5-1-1 Understand the present condition of the freshness of captured products

5-1-2 Consider the standardization of the quality

5-1-3 Examine the handling method of captured products on board

5-1-4 Examine the improvement of fishing methods

The present condition of the freshness of fisheries products is investigated at first, and the problems are clarified. Then, standardization of quality is considered based on the quality control situation for every fisherman and fishing village. Furthermore, handling method of the products, which the artisanal fishermen can carry out, is examined. Moreover, the fishing method for keeping freshness good is also examined.

5-2 Transfer new technology to the fishermen in order to improve the freshness of fisheries products

5-2-1 Elaborate educational materials

5-2-2 Promote fisheries organizations to accept the new handling methods

5-2-3 Hold the workshops for the fishermen

In order to make it well known to the fishermen the result of freshness improvement examination of fisheries products as the quality control concept, a manual is created, the education activities are carried out for the fisheries organizations and the workshops are held for the fishermen. If it is possible, it would be better for the workshops to be held by combining with the spread activities of a resources management concept. In addition, it is necessary to create educational materials and workshops to the fishermen in consideration of literacy etc.

5-3 Investigate the improvement situation in the quality control

5-3-1 Evaluate new technology and implementation process

5-3-2 Recommend to the Ministry of Health the establishment of national policies on quality control

Periodical monitoring is performed whether the quality control concept is accepted in the fishermen.

5-4 Instruct the quality control in fisheries communities

5-4-1 Incorporate the involved institutions in the training plans through the CDCGN
Based on the result of the improvement situation in the quality control, the instruction is done in fishing villages. This instruction is carried out in model in several villages, obtaining cooperation of INA and other organizations through the coordination of CDCGN. In addition, as for the continuous spread activities in all fishing villages, it is desirable to carry them out through INA.

6-1 Consider the freshness improvement policy in a circulation stage

6-1-1 Investigate and evaluate the present condition of the freshness in a circulation stage

6-1-2 Improve handling methods

6-1-3 Evaluate the improvement of handling methods

The present condition of the freshness of a circulation stage is investigated and the improvement of handling method is examined.

6-2 Train traders

6-2-1 Hold workshops for traders

6-2-2 Elaborate educational materials

The workshop for the distribution companies is held and a remedy is proposed. In addition, the necessity and the contents are examined about manual creation. And the manual is then elaborated by the organizations concerned.

6.6. Inputs

The inputs of the project were defined as follows.

【Japan】

- Chief advisor with fishery policy
- Coordinator
- Expert of resources management
- Expert of quality control
- Short-term experts
- Equipment
- Counterpart training in Japan

【Costa Rica】

- Allocation of counterparts from UNA and INCOPECSA for each Japanese expert
- Allocation of land, offices, research facilities necessary for the project Puntarenas, Punta Morales and San Jose as necessary.
- Tools, vehicles, instruments, etc.
- Operation costs

6.7. Analysis of external factors

The external conditions that the project can not control, but have big influence on achievement of the outputs, the purpose, etc. of the project were deliberated, and the following things were checked.

6.7.1. External factors for the activities

Update of the law : Revision of fishing law is now discussed by Parliament, and in order to decide upon a fisheries resources management plan, the law needs to be revised appropriately. The law will hopefully be revised within one year from now on.

6.7.2. External factors for the outputs

None : Since the project purpose is the construction of a system, the project purpose is attained by obtaining the outputs after carrying out the inputs and activities as planned, and obtaining a result.

6.7.3. External factors for the project purpose

If the following conditions are fulfilled when the sustainable fishery system that is the project purpose is built, the overall goal will be attained.

No aggravation of the environmental pollution in the Gulf of Nicoya : When a serious environmental pollution occurs, it becomes impossible to perform the fisheries activities themselves. Although the contaminants of shellfishes are analyzed in this project, the measure against environmental pollution is not included.

No worsening of the environment by natural phenomenon : When the environment gets worse greatly by weather conditions, the implementation of fisheries activities become difficult. On the other hand, this measure is difficult.

Cheap fisheries products not imported in large quantities : When extremely cheap fisheries products are imported from neighbor countries and effective measures are not

taken, the fisheries activities decline. And when the prices of fish and shellfishes fall, the effect of the quality control is lost and the spread becomes difficult.

6.7.4. External factors for the overall goal

The sustainable fishing that is the overall goal is attained, and fulfilling the following conditions further attains the super goal.

Creation of employment : It was checked that alternative means other than a fishing are required in order for "fishermen's household income to improve" in the objectives analysis. When the number of fishermen needs to be reduced by regulating the fishing effort, a new income source is required. Aquaculture, fishery processing, sightseeing, etc. can be considered as an alternative.

Commercialization and promotion of fisheries products : When the domestic consumption of fisheries products increases and processed fisheries products also spread, the price of fish which distribution companies buy from the fishermen in fishing villages will rise, and single fisherman's sales will increase further.

6.7.5. External factors for the super goal

The improvement in life quality of artisanal fishermen continues after the end of this project by fulfilling the following conditions.

Continuity in the national policy : After the end of this project, even if the political power changes, the policy that promotes the sustainable fisheries for the artisanal fishermen needs to be continued.

Economical stability : When the national economy gets extremely worse, the lives of the Costa Rica people including the artisanal fishermen do not improve.

6.8. Project Operation Structure

Regarding the present condition and the role of the related organs about the implementation structure of the project, it is already stated in Chapter 5.

6.8.1. Responsible persons for management of the project

The whereabouts of the responsibility for management is as follows.

- MSc. Juana Maria Coto, Dean of College of Exacts and Natural Sciences as the project director, it has the responsibility for the whole enforcement of the project.
- MSc. Jorge Arturo Rodriguez, Director of the Biological Sciences School as a project manager by the side of UNA, it has the responsibility of the management and the technical sides.
- Lic. Oscar Pacheco, Coordinator of EBM as a project coordinator by the side of UNA, it performs coordination and supports the project manager in the management of project implementation.
- Lic. Antonio Porras Porras, General Technical Director, as a project manager by

the side of INCOPECSA, it has the responsibility of the management and the technical sides of the project.

- Dr. Fernando Viquez Alfaro, Advisor to Executive President as a project coordinator by the side of INCOPECSA, it performs coordination and supports the project manager in the management of project implementation.
- The Japan side Chief Advisor performs advices required for the project director and both the project managers about all the matters relevant to implementation of the project.
- The Japan side coordinator performs coordination and supports Chief Advisor in the management of project implementation.
- The Japan side experts perform required technical instructions and advices relevant to implementation of the project.

6.8.2. Project operation structure

As shown in the organization figure (separate attachment), for a smooth and effective operation of this project, the joint coordinating committee and the steering committee by the members of both Costa Rica and Japan sides are established. The purpose, the function and the composition members of each committee are as follow.

(1) Joint coordinating committee

The joint coordinating committee is established so that the technical cooperation of the project may be carried out effectively and successfully.

Composition of the committee: The project director will be the chairperson of the Joint coordinating committee, and project managers and the chief of the Japanese expert team will be vice-chairperson. The composition members are shown in Table 15.

Function of the committee: The committee is held at least once per year and the function is as follows.

- According to R/D, recognize the annual operation plan that was set up in the project.
- Review the overall progress of the technical cooperation program, especially the activities carried out on the basis of the above-mentioned annual operation plan.
- Review and carry out opinion exchange about the main problems generated from the technical cooperation program and its related matters.

Table 15. Members of the joint coordinating committee

Composition	Members
Chairperson	MSc. Juana Maria Coto, Dean of College of Exacts and Natural Sciences of UNA
Vice-chairpersons	MSc. Jorge Arturo Rodriguez, Director of the Biological Sciences School of UNA Lic. Antonio Porras Porras, General Technical Director of INCOPECSA Chief advisor of Japanese expert team
Costa Rican side	1 President of UNA: Dr. Sonia Marta Mora.
	2 Executive President of INCOPESC: Prof. Ligia Castro Ulate
	3 Coordinator: Lic. Oscar Pacheco, EBM Dr. Fernando Viquez, INCOPECSA
	4 Counterparts of UNA: Chief Lic. Cristian Fonseca (Quality control) Lic. Emilia Calvo Vargas (Red tide and shellfish toxins) Lic. Hernan Vargas Barrantes (Microbiology) An instructor from Chemistry field Chief Lic. Jose A. Palacios (Fishery evaluation) Lic. Rosa Soto Rojas (Fishery biology) Lic. Alberto Villarreal (Fishing methods) MSc. Rigoberto Viquez (Fisheries) MSc. Luis Villalobos (Fishery extension) MBA. Angel Herrera (Resource management: studying abroad) MSc. Farid Tabash (Fishery evaluation: studing abroad)
	5 Counterparts of INCOPECSA Lic. Antonio Porras Porras (Fisheries policy) Dr. Rolando Ramirez Villalobos (Marketing and Quality control) Ing. Giselle Blanco Venegas (Quality control) Lic. Cecilia Soto Monge (Quality control) Lic. Hubert Araya Umaña (Resources management) Prof. Adan Chacon (Statistics) Lic. Berny Marin (Environmental control)
	6 Coordinator of CDCGN
	7 Representatives of Organizations concerned
Japanese side	1 JICA experts
	2 Resident Representative of JICA Costa Rica Office
	3 Representative of the Embassy of Japan

(2) Steering Committee

The steering committee is held 1 time or if needed in one month, aiming at smooth enforcement of the activities of the project.

Composition of the committee: The project director will be the chairperson of the Joint coordinating committee, and project managers and the chief advisor of the Japanese expert team will be vice-chairperson. The composition members are shown in Table 16.

Function of the committee :

- Recognize the contents of activities in alignment with the month-long work plan and the annual work plan of the project.
- Review the progress of the technical cooperation program, especially the activities carried out on the basis of the above-mentioned annual operation plan.
- Evaluate the achievement situation of the purpose.

Table 16. Composition of the steering committee

Composition		Members
Chairperson		MSc. Juana Maria Coto, Dean of College of Exact and Natural Sciences of UNA
Vice-chairpersons		Lic. Antonio Porras Porras, General Technical Director of INCOPECSA, MSc. Jorge Arturo Rodriguez, Director of the Biological Sciences School of UNA, Chief advisor of Japanese expert team
Costa Rican side	1	Coordinator, UNA
	2	Coordinator, INCOPECSA
	3	Counterparts of UNA
	4	Counterparts of INCOPECSA
	5	Coordinator of CDCGN
Japanese side	1	JICA experts

6.9. Prior duty and Precondition Necessary

The precondition to be checked was checked before the project implementation.

Cooperation of each organization

Construction of a sustainable fishery system is attained with the cooperation of each organization. Now, as a control organization about the fishery problems of the Gulf of Nicoya, there is CDCGN in which each related organization has participated. The CDCGN has joined as a member of the joint coordinating committee and the steering committee of this project. Therefore, it is thought the each organization will be in a cooperation relationship with this project, it is necessary for the project to demand the cooperation to the CDCGN in advance.

7. NECESSITY AND JUSTIFICATION FOR PROJECT

7.1. Fairness and Public Benefits

Although Costa Rica whose national income is high (GDP per capita: 3943.2 dollars, 2000) in Central America countries had been called one of the countries with the highest employment rate, the unemployment rate raised to 5.7% in 1997 and a cloud has been hanging over the employment situation in recent years. The influence on the agriculture by the international price fall of coffee and banana which are especially main export agricultural products was large, and in order that the farmers who were working in these plantations may do the fishing from which cash earnings are obtained quickly, they came to go into the Gulf of Nicoya. The most of them are unauthorized fishermen. Consequently, in the Gulf of Nicoya, since fishermen increased in number too many, the fishing becomes an overfishing and the fishing amount is decreasing. Those who do the so-called violation operation that protects neither mesh size restrictions of gill net nor hook number restrictions of longline in connection with the reduction of fishing amount have come out, and it has become a serious social problem. For this reason, although the Costa Rica government is going to revise fishing law and to make the control severe, it is thought that only the revision of law will not become a fundamental solution of the problem.

The governmental agency INCOPESCA taking the lead in fishery management of the Gulf of Nicoya, and UNA currently asked for researches with effectiveness have technological problems. Moreover, although each organization is carrying out respectively original researches or original plans, there has not been an overall approach to resolve the problems that the Gulf of Nicoya has. Then, the government established the CDCGN in INCOPESCA in January, 2000 in order to carry out the arrangement and integration of the activities of the government and the people about the management and development of the Gulf of Nicoya and to further effective plans, with the government organizations, the scientific organizations, the local regional authorities and the private sector organizations as the committee members.

Since it is under such situations, it is consider very timely that the technology based on Japan's experience is introduced now, the project on the themes of management of fisheries resources and the quality control of fisheries products is undertaken, and the fisheries management of the Gulf of Nicoya is tackled by this project in cooperation with CDCGN.

Moreover, the result of this project affects the artisanal fishermen of not only the Gulf but also the whole country through INCOPESCA and UNA. Thinking it only from the quality control side, when it is thought that the result of the project affects fisheries product distribution companies and processors of all over the country, and consumers can come to hand good quality fish and shellfishes as the result, it can be said that this project has public benefits and fairness enough.

7.2. Technological Accuracy

This project aims at building a sustainable fishery system by enforcement of the policy for creation and implementation of the fisheries resources management plan of the Gulf of Nicoya, and the improvement in quality of fisheries products. It can coordinate with related organizations and fishermen. The technologies developed by this project in fishing statistics, resources evaluation, freshness management, etc. are expected to be applied not only to the artisanal fishermen of the Gulf of Nicoya but also to those of the whole country. Furthermore, these technologies are also expectable to be applied to all the coastal developing countries.

7.3. Japan's Superiority in the Fields

Japan surrounded by the sea is the fishery country that was proud of the world's No.1 in fishing amount in the past. Although the seat of the first place was taken by China a long time ago, there is no change in being still fishery country Japan. Many scientific organizations, fishery research organizations, private corporations, etc., have done researches on resources management and quality control. This history is long and the technology is in the top level in the world. Moreover, in Japan, the systems, such as the Fisheries Agency into first in a roll, the fishery coordinating committees, fishermen's unions and fishermen's cooperative associations, have developed. On the other hand, the fishermen's organizations are all over the country. Such organizations coordinate with the above-mentioned research organizations, and the resources management of each region is performed. Therefore, this project is a technical cooperation of the fields made the most elated for Japan.

7.4. Project's Expected Impact

7.4.1. Political impact

This project aims at building a sustainable fisheries system to the Gulf of Nicoya by the management of fisheries resources and the quality control of fisheries products. It is expected complementing the plan of the government called development and sustainable production of the fishery field contained in the agriculture-and-livestock development project (1998 - 2002) while it can provide this plan with technical support and it can be said for the political impact to be large.

7.4.2. Institutional impact

Although the monitoring of fishing activities or resources and the monitoring of contaminants and shellfish toxin accumulation must be periodically carried out after building an orderly system, such a system has not been built yet. The system put in order is built by this project and the periodical monitoring is carried out. When this system is taken by the Ministry of Welfare, MAG and INCOPECSA to spread not only to the Gulf but also to the whole country, the institutional impact of this project could be very large.

7.4.3. Social impact

7.4.3.1. Beneficial group's feature

The direct beneficial persons of this project are the researchers and administration persons in charge of resources management and quality control of related organizations including UNA and INCOPECA. Moreover, the final beneficial persons are various including from artisanal fishermen to consumers as shown in Table 17, since this project is aiming at construction of a sustainable fishery system.

Table 17. Beneficial group's feature

Group	Beneficiary	Beneficial feature
Government	INCOPECA	Improvement of the capabilities on resources management and quality control, spread activities and training technology
	CDCGN	Strengthening of coordination capability
	CENADA	Improvement of quality control capability
Scientific organizations	UNA	Establishment, improvement and spread of the technology of resources management and quality control
	CDCGN	
	INA	Improvement of training capability
Fisheries	Artisanal fishermen of the Gulf	Improvement of the consciousness on resources management and quality control and improvement of future life
	Fish shops · Fish markets	Improvement of the consciousness on quality control
	Brokerage contractors	
	Transporters	
	Processors	
	Exporters	
Civil	Habitants in the Gulf	Obtaining good quality fisheries products
	Consumers	

7.4.3.2. Benefit description

Target group of this project is the artisanal fishermen of the Gulf of Nicoya said for about 3500 to be. The fishing gears and fishing methods for the sustainable fishing are examined and the measures for shipping fisheries products with the higher prices are taken for them in this project. Moreover, the technology about resources evaluation and quality is introduced into the researchers of UNA or INCOPECA. The progressed management technique of Japan is told to administration persons in charge, and the management technique suitable for the Gulf of Nicoya is devised. In this project, although the approach of circulation is not taken, it is considered to give a good impact called improvement in quality control consciousness to distribution companies such as brokerage contractors, transportation contractors, and selling contractors.

7.4.4. Technical impact

7.4.4.1. Number of trainees for technology transfer

The counterpart candidates are 14 persons from UNA and 8 from INCOPESCA. Directly, these 22 persons become the trainees for technology transfer. However, since CDCGN plays a big role in this project, if it is the person of the organizations belonging to this committee, anyone can include in the trainees for technology transfer.

7.4.4.2. Contents of technology transfer

Resources management and the quality control technique are mastered, and technology transfer required in order to build the sustainable fisheries system in the Gulf of Nicoya is performed. The contents of technology transfer meet in the fundamental direction stated by "Activities of 6.5." and the concrete program is created. After the end of the project, using the mastered technology and the educational materials created during the project, UNA and INCOPESCA must continue and develop the program so that a sustainable fishing may be performed in the Gulf of Nicoya. And it is expected that these management techniques are spread and established in various places, and contribute to fisheries management of whole Costa Rica.

7.4.5. Economical impact

The trial calculation that artisanal fishermen's income goes up 20% can be made on a basis of about 20% of fisheries products being of inferior quality and not being shipped. It is sure that the artisanal fishermen and the persons concerned with the fisheries in the Gulf of Nicoya would benefit in the future like as the income increase of the artisanal fishermen by the results of the implementation of this project. And it is thought that the economical impact will not be small. However, it is difficult at the present stage to quantify the impact. Since the sustainable fishery system itself stops realizing if fishery population increases like the present and overfishing continues, it is pressing need to work on the policy for suppressing the increase in fishery population and eliminating illegal fishing. For this reason, not only strengthening of the control by revision of the law, but also creation of alternative industries, such as mariculture, fisheries processing and sightseeing, is needed. It is expected that the sustainable fisheries management system built in this project functions, and such alternative industries are also examined in this project so that bigger economical impacts may be obtained.

7.5. Comprehensive Evaluation of Project Implementation Validity

The Costa Rica side fully recognizes the importance of this project, and has a great hope to the result by implementation of the project. Although about 60% of fishery production of Costa Rica was fished once (the 1960s) in the Gulf of Nicoya, the fishing amount is decreasing rapidly, so that 22% is occupied now. Many researches of the former has therefore been done for development and conservation of the Gulf of Nicoya in such a situation, however effective measures have not been taken yet. By carrying out this project, these researches will be integrated, and a sustainable fisheries system will be built for the first time by introducing new technology and techniques. The result of this project can be considered as a sample good for the construction of a fisheries

management system in all regions of Costa Rica and also in Central American developing countries, and it can be estimated that the ripple effect is enormous.

ANNEX

1. JICA EXPERTS AND JOCV DISPATCHED TO UNA IN RECENT YEARS
2. ADMINISTRATION STRUCTURE OF THE PROJECT
3. PROJECT IMPLEMENTATION STRUCTURE
4. ORGANIZATION CHART OF INCOPECA
5. ORGANIZATION CHART OF EBM
6. ORGANIZATION CHART OF FCEN
7. ORGANIZATION CHART UNA
8. OBJECTIVES ANALYSIS
9. COMPARISON OF PROJECT
10. PROJECT DESIGN MATRIX (PDM)
11. PLAN OF OPERATION

ANNEX 1

JICA EXPERTS AND JOCV DISPATCHED TO UNA IN RECENT YEARS

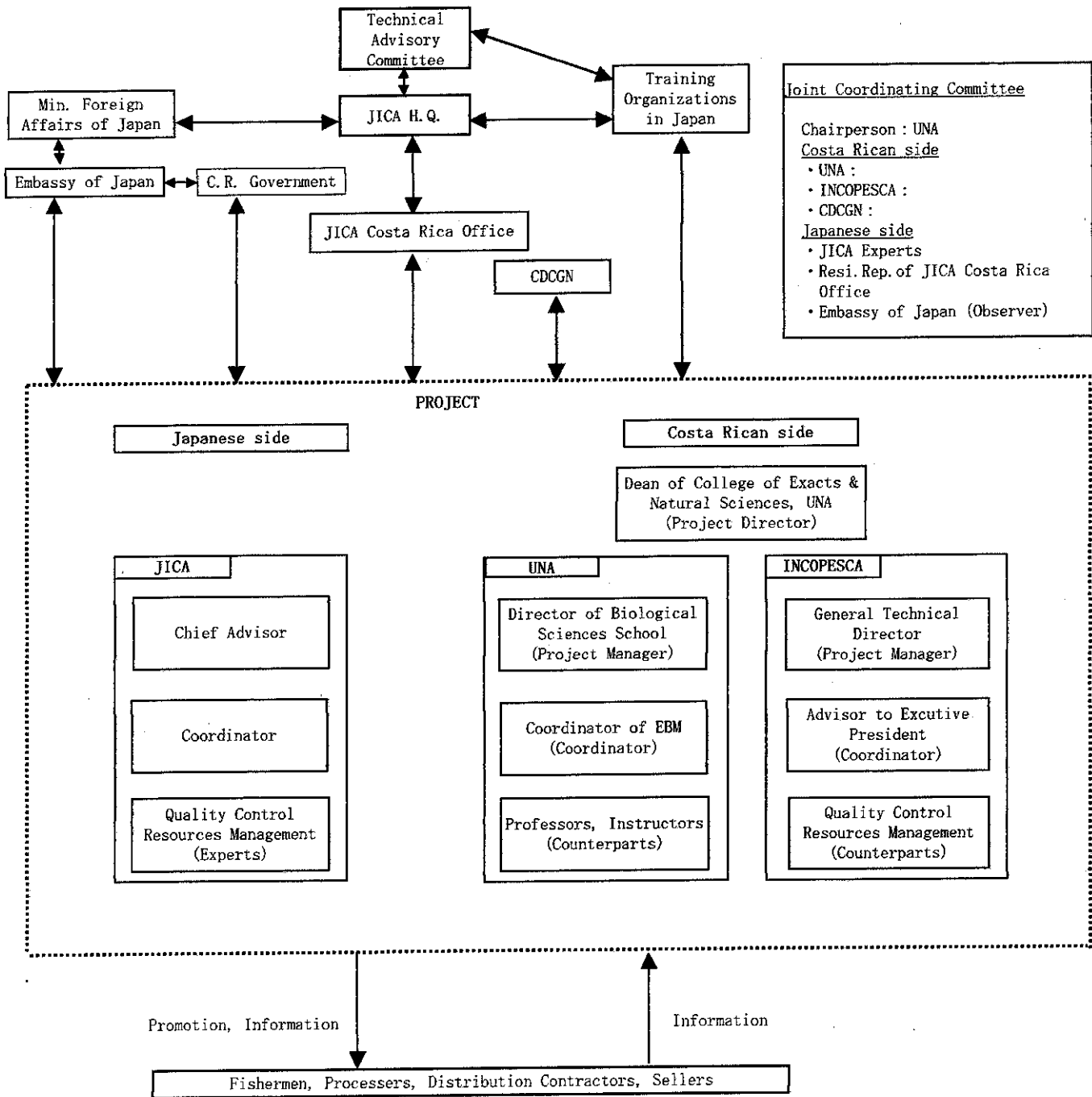
Year Dispatched	Form of Dispatch	Name	Field of Dispatch	Date of Start (Month & Year)	Date of End (Month & Year)
1998	JOCV	Y. NAGAHAMA	Aquaculture	Dec. 1998	Dec. 2000
1996	JOCV	M. NISHIYA	Aquaculture	Dec. 1996	Dec. 1998
1995	JOCV	T. OSHIMA	Aquaculture	Dec. 1995	Dec. 1997
1993	Expert	H. KITANI	Shrimp culture	Mar. 1994	Mar. 1997
1988	Expert	M. TAKANO	Shrimp culture	Apr. 1988	Apr. 1991
1984	JOCV	Y. YAMANAKA	Aquaculture	Nov. 1984	Nov. 1986
1981	JOCV	M. TAKATUKA	Aquaculture	Oct. 1981	Nov. 1984

JICA: Japan International Cooperation Agency

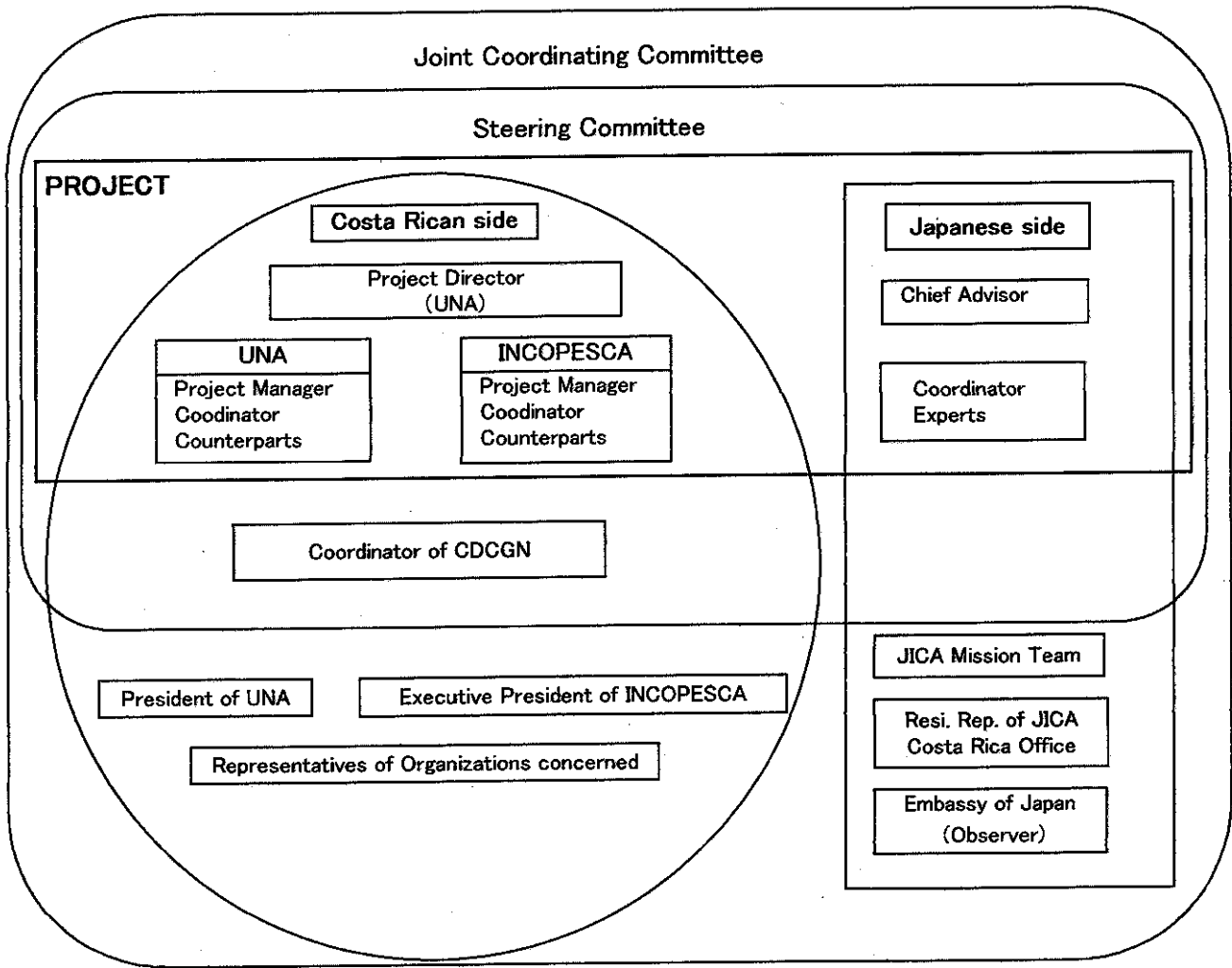
JOCV: Japan Overseas Cooperation Volunteer

ANNEX 2

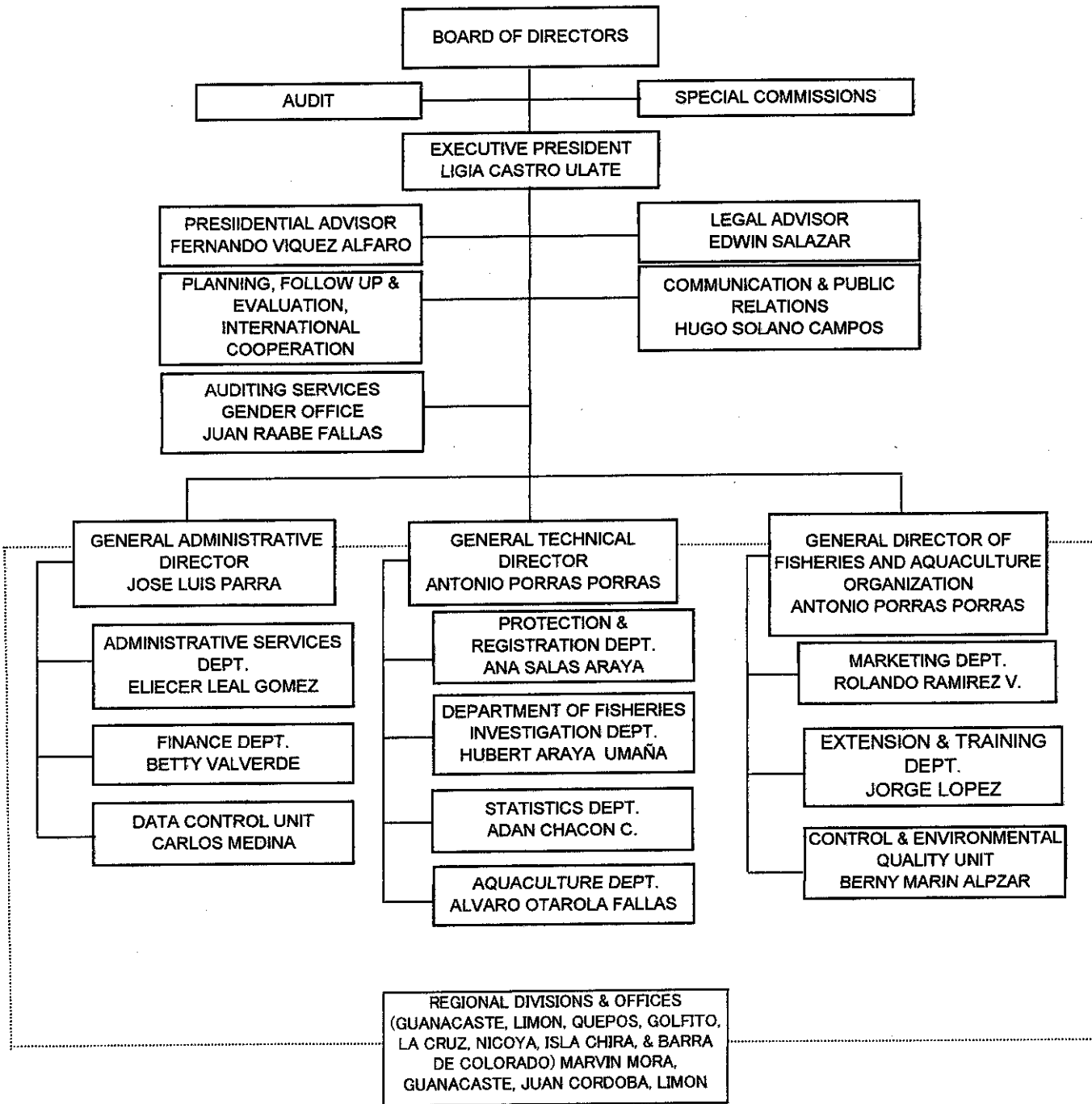
ADMINISTRATION STRUCTURE OF THE PROJECT



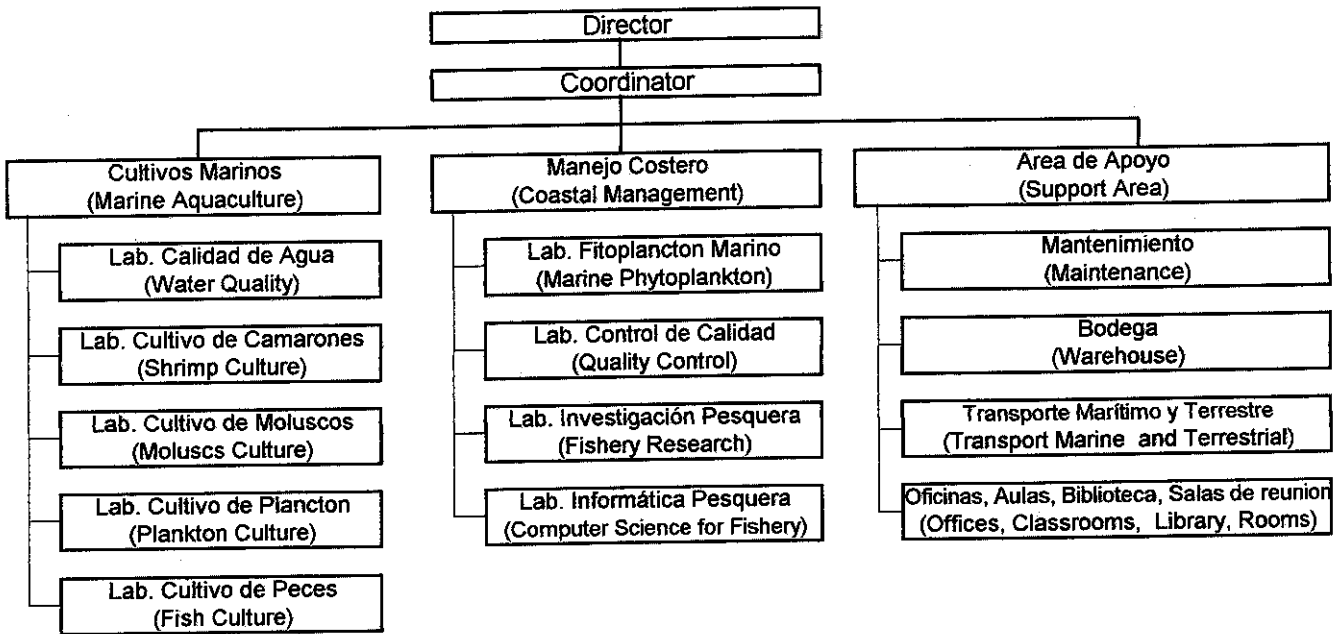
PROJECT IMPLEMENTATION STRUCTURE



Organization Chart of INCOPESCA



Organization Chart of EBM

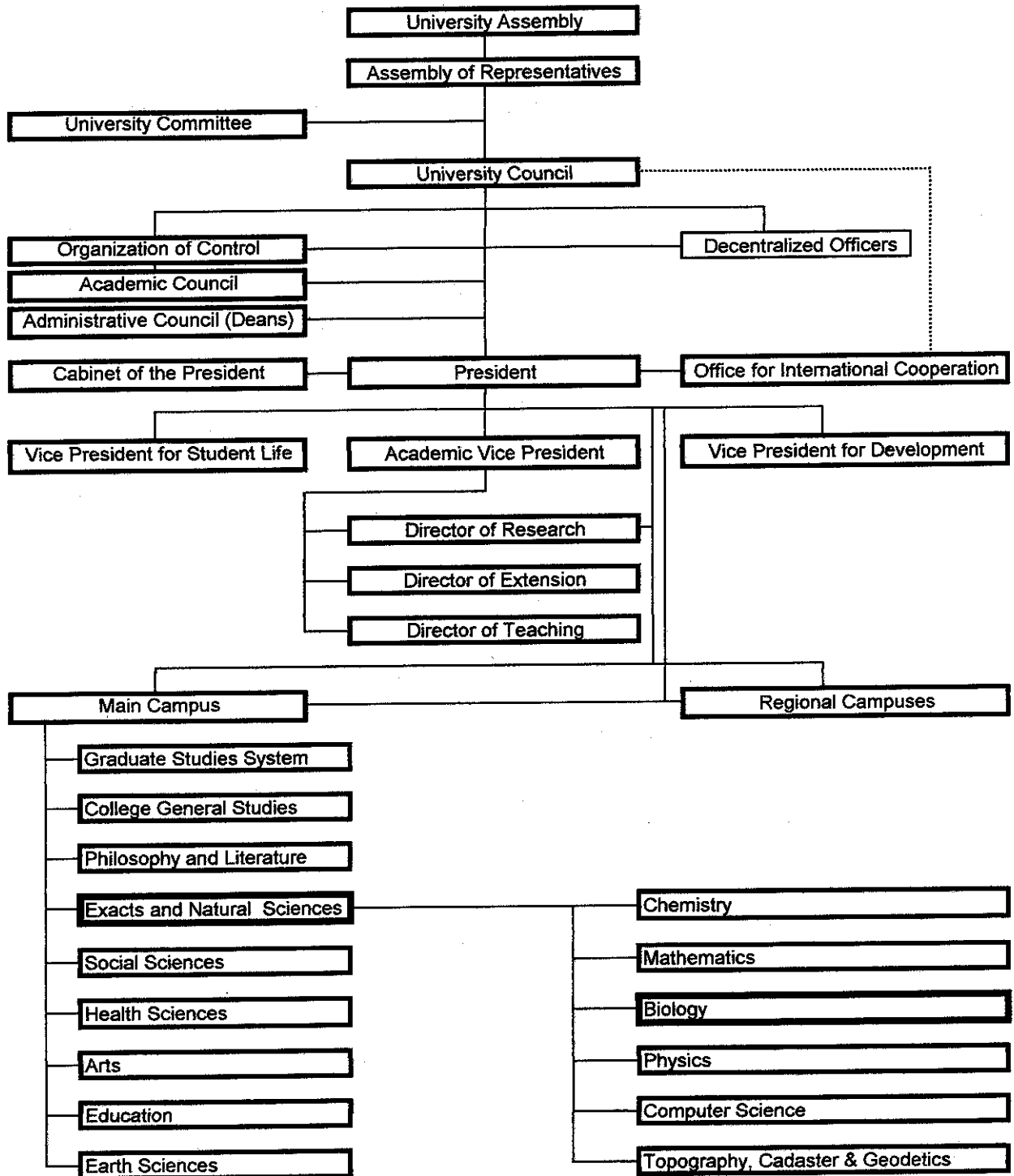


ANNEX 6

Organization Chart of FCEN

Facultad de Ciencias Exactas y Naturales (College of Exacts and Natural Sciences)		MSc. Juana Coto Campos Dr. Luis Manuel Sierra	Decana (Dean) Vicedecano (Vice Dean)
Departamento Fisica (Department of Physics)		MSc. Roberto Moya MSc. Jaime Wright	Chairman Vice Chairman
Esc. de Química (School of Chemistry)		Dr. Juan Valdez Lic. Marta Fonseca	Chairman Vice Chairman
Esc. de Matemática (School of Mathematics)		Lic. Norma Adolio Lic. Fabio González	Chairman Vice Chairman
Esc. de Topografía, Catastro y Geodesia (School of Topography, Cadaster & Geodetics)		Ing. Ricardo Ucles Ing. Gerardo Chavez	Chairman Vice Chairman
Esc. de Informática (School of Computer Science)		MSc. Alberto Segura MSc. Elizabeth González	Chairman Vice Chairman
Esc. de Ciencias Biológicas (School of Biological Sciences)		MSc. Jorge A. Rodriguez Lic. Judith Hidalgo Rojas	Chairman Vice Chairman
Estación de Biología Marina (EBM) (Marine Biology Station)		Director : MSc. Jorge Arturo Rodriguez (Marine ecology) Coodinator : Lic. Oscar Pacheco (Marine Biology)	
Estación Acuicola 28 Millas		28 Miles Station for Freshwater Aquaculture	
Estación Truchicola Río Macho		(River Macho Trout Culture Station)	

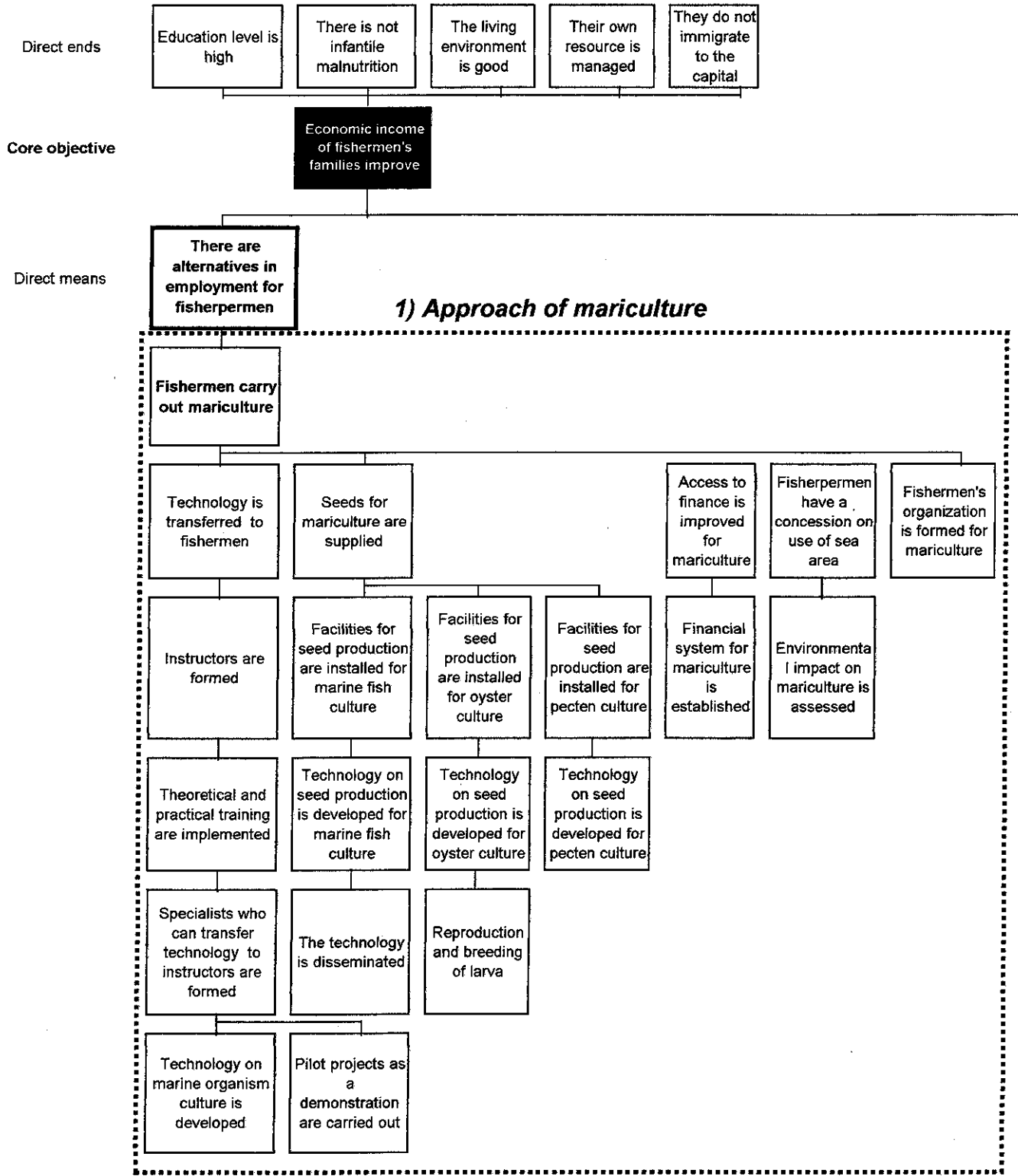
Organization Chart of UNA



ANNEX8 OBJECTIVES ANALYSIS

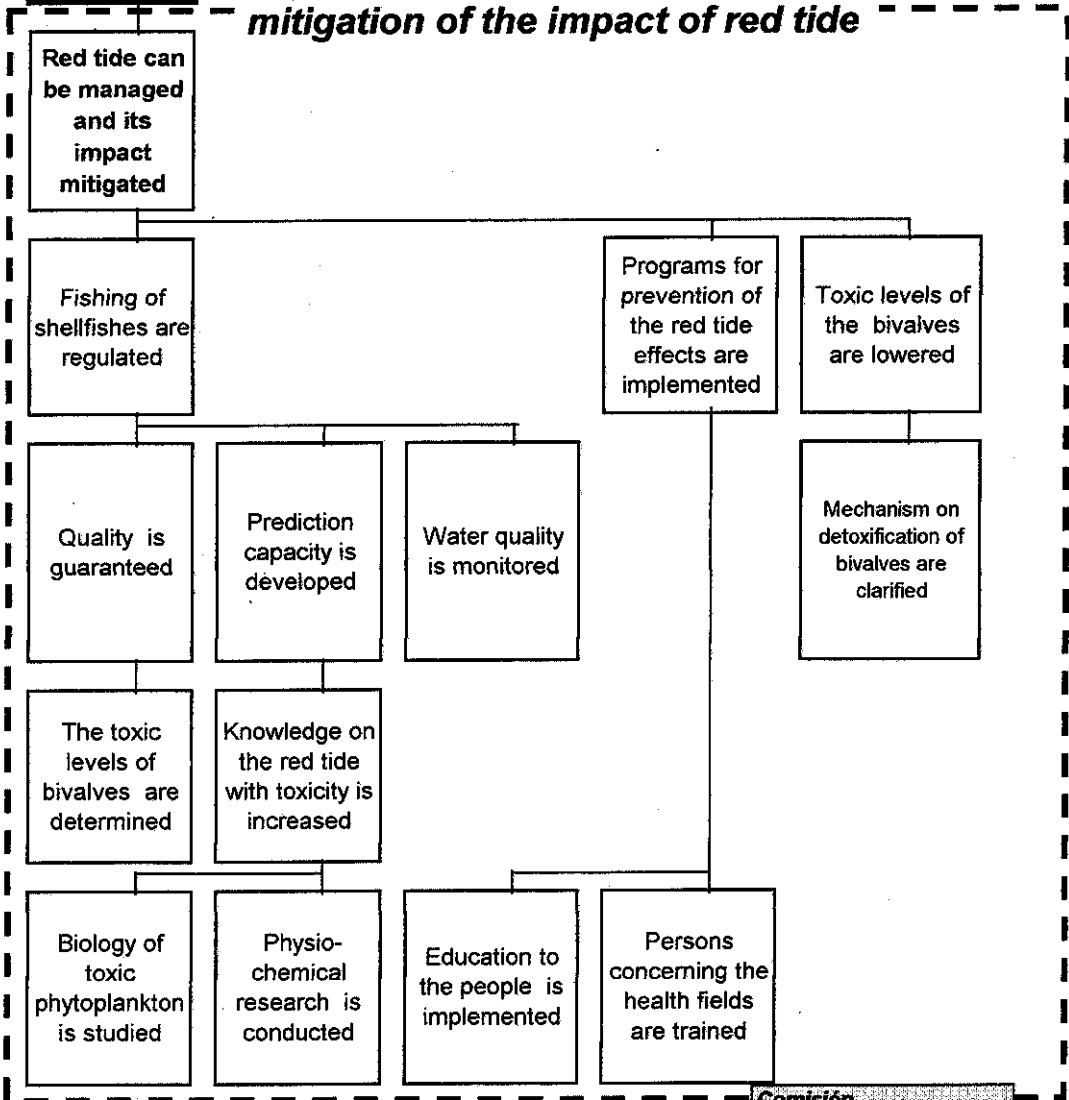
Target group : Small-scale fishing group

Life of artisanal fishermen's families is improved



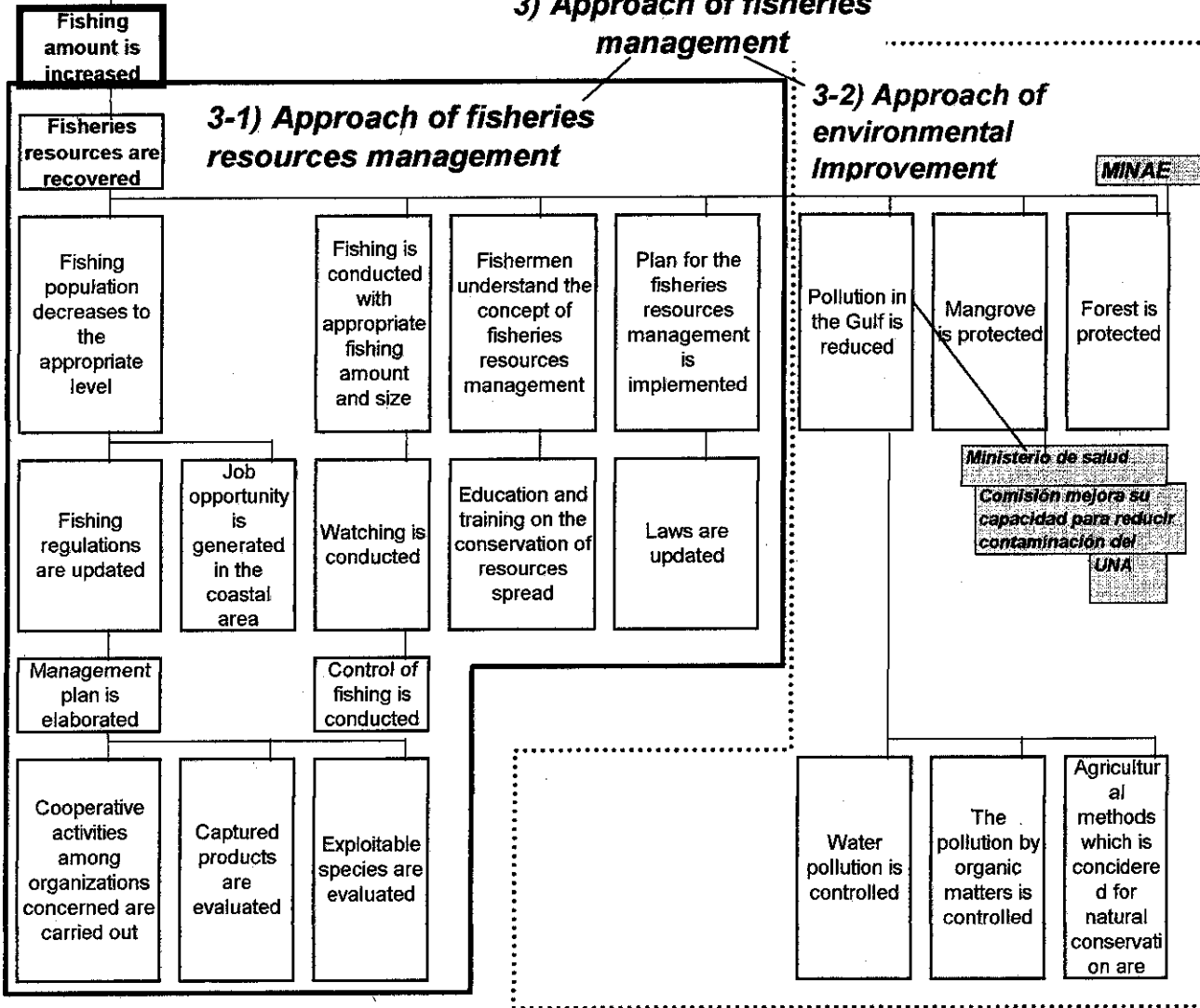
Fishermen
can fish
shellfishes

2) Approach of management and mitigation of the impact of red tide

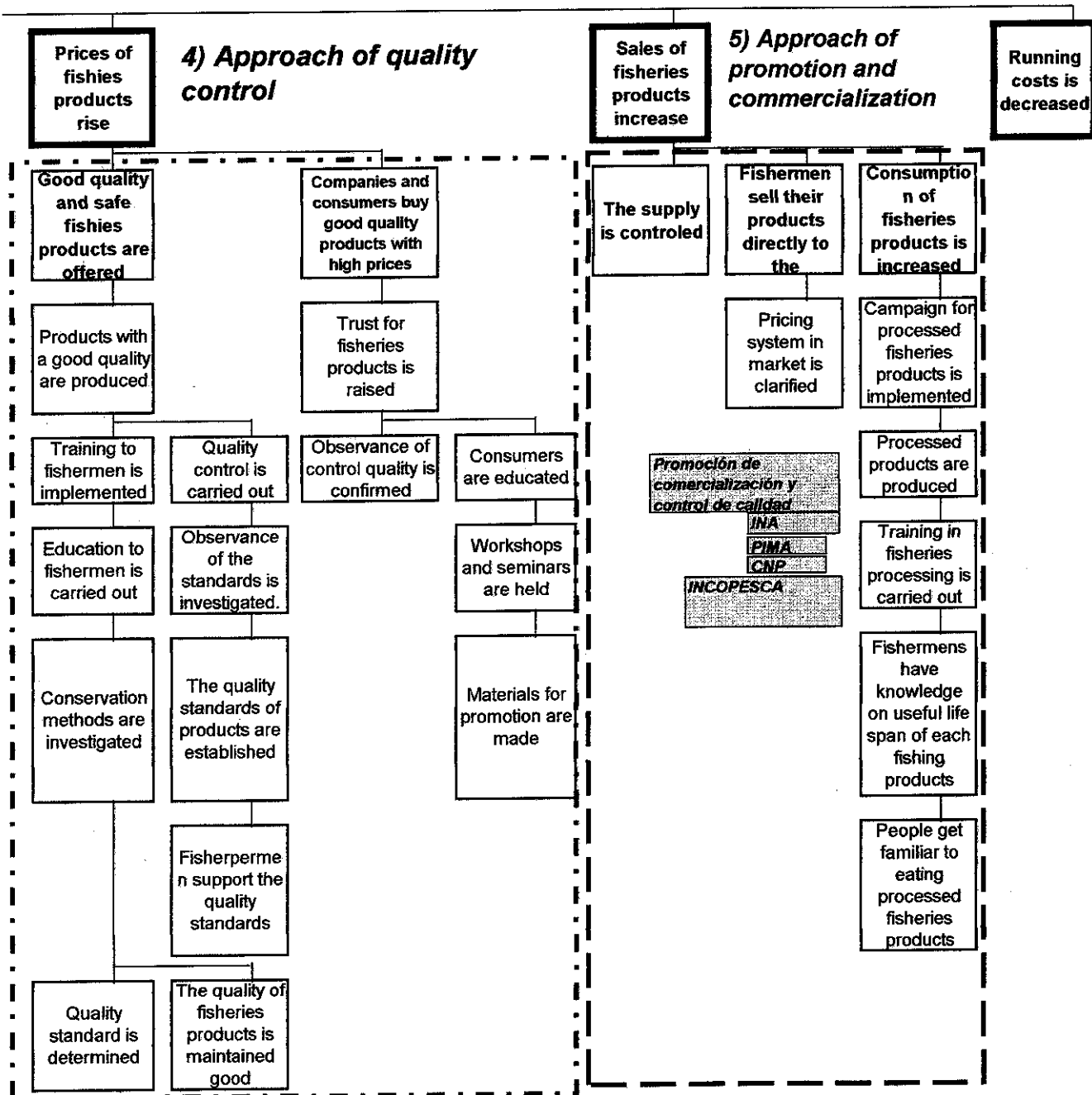


**Comisión
interinstitucional para
vigilancia de la marea
roja en costa rica**

3) Approach of fisheries management



6) Approach of reduction of production costs



ANNEX 9

Comparison of Project

	Red tide	Mariculture	Insurance of the quality control	Fisheries Resources Management
1. Benefit of Artisanal fisheries	High	Low (at the present)	High	High
What? How?	Benefit about US\$ 1million to shellfish extractors of about 500 families	Benefit only to small groups (about 20 families)	Benefit to All fishermen (about 4,000families)	Benefit to all fishermen (about 4,000families)
2. Possibility				
Overall goal	High	Low	High	High
Project purpose	High	High	High	High
Output	High	High	High	High
3. Fund, Personnel and equipment needed				
Money	Ordinal	Ordinal	Ordinal	Not so much
Personnel	Ordinal	Ordinal	Lack of personnel	Ordinal
Equipment	Ordinal	Ordinal	Ordinal	Ordinal
4. In case of insufficient fund, personnel and equipment, Concrete plan?				
Necessity in future	No Finance needed to search	No Installation needed for seed production Marine park	Finance from industrial companies	Finance needed to search Human resource training
5. UNA-INCOPESCA (Counterparts)	UNA (1 Chemical, 2 Biologists, 1 Farmer) INCOPESCA	UNA(1 in Fish, 2 in Mollusks, 1 Assistance) INCOPESCA (2 in aquaculture)	UNA (3 biologists, 3 microbiologists) INCOPESCA (2 inspectors) INA(1inprocessing)	UNA (6 Biologists) INCOPESCA (5 Biologists and inspectors), INA (Biologists)
Total No. Counterparts	U 3, P 1, = 4	U 3, P 2, I 1=6	U 2, P 2, I 1 = 6	U 6, P 6, I 2 = 14
Necessity	△	△	○	○
No. of Beneficial	About 500 families	20 to 100 families	About families 4000	About families 4000
Achievement	High	Middle: Take a time	High	Middle: Take a time

U: UNA, P: INCOPESCA, I: INA

The Project Design Matrix

Project's name: Sustainable Fisheries Management in the Gulf of Nicoya Duration: 2002-2007
Place: Gulf of Nicoya and surroundings. Objective group: Small-scale fishing groups

November 2001

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Super Goal Household incomes of artisanal fishermen are improved	Their income is higher than minimum wage	Income investigation of fisherperson's families	Continuity in the national policy : Economical stability
Overall Goal Sustainable fisheries are performed	The fishing amounts of artisanal fishermen become stable	Fisheries statistics	Creation of employment Increase of fisheries products consumption and spread of fisheries processed products
Project Purpose Construction of a sustainable fishery system	The fishing amount of main species is repeatedly obtained within the planned amount The quality of products caught by artisanal fishermen is improved	Report of the Project Fisheries statistics Organoleptic test K value, etc.	No aggravation of the environmental pollution in the Gulf of Nicoya . No worsening of the environment by natural phenomenon Cheap fisheries products not imported in large quantities

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Outputs			
1. A fisheries resources management plan is drawn up appropriately.	The plan is accepted by artisanal fishermen The plan reflects the results of investigation	Document of plan	
2. The fisheries resources management plan is appropriately implemented.	Training of 22 fishing communities in the Gulf of Nicoya Periodical watching is conducted.	Workshops record: Number of participants Survey results Watching report	
3. The fisheries resources management plan is periodically updated	Verify if the activities plan was updated	Document of the activity plan result.	
4. A safety improvement policy of shellfishes is drawn up.	Carry out the proposal	Document of the plan	
5. A freshness improvement policy of fisheries products is spread.	Increment in the use of rejected fish because of bad quality. Training of 22 fishing communities in the Gulf of Nicoya	INEC's statistics The study of fishing (activity) Workshops record: Number of participants Survey results	
6. The freshness improvement policy of fisheries products in a circulation stage is spread.	Training of 22 fishing communities in the Gulf of Nicoya	Workshops record: Number of participants Survey results	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>1-1 Elaborate the plan of activities</p> <p>1-2 Understand the actual condition of fisheries</p> <p>1-2-1 Investigate landing situations (size, species, seasonal variation)</p> <p>1-2-2 Investigate fishing gears and methods</p> <p>1-2-3 Examine fishing gear selectivity and environmental impact</p> <p>1-2-4 Evaluate new fishing methods</p> <p>1-2-5 Investigate the structures of fishery communities</p> <p>1-3 Evaluate the resources of fishing species and exploitable species</p> <p>1-3-1 Fix landing statistics</p> <p>1-3-2 Conduct ecological investigation of species utilized and exploitable species</p> <p>1-3-3 Examine the biology and reproduction forms</p> <p>1-3-4 Build a database of resources evaluation</p> <p>1-3-5 Evaluate the resources of species utilized and exploitable species.</p> <p>1-4 Elaborate the plan of resources management</p> <p>1-5 Discuss on the plan in the organs concerned</p> <p>1-5-1 Check the plan</p> <p>1-5-2 Coordinate with other organizations concerned through the cooperation with CDCGN</p>			Fishery Law is updated

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>2-1 Make it well-known to the fishermen the resources management concept</p> <p>2-1-1 Create educational materials</p> <p>2-1-2 Promote fishermen's organization</p> <p>2-1-3 Hold workshops for fishermen</p> <p>2-2 Manage the artisanal fishery organizations</p> <p>2-2-1 Watch the activities of the illegal fishery</p> <p>2-2-2 Design and suggest the supporting system for the fishermen.</p>			
<p>3-1 Monitor fishing activities</p>			
<p>3-2 Monitor fisheries resources</p>			
<p>3-3 Investigate the enforcement situation of the plan</p>			
<p>3-4 Discuss on the revision of the plan in the organs concerned</p>			
<p>4-1 Grasp the present condition of shellfish contamination and toxin accumulation</p> <p>4-1-1 Fix the data of the past</p> <p>4-1-2 Analyze the contaminants of shellfishes</p> <p>4-1-3 Analyze the shellfish toxins caused by red tide</p> <p>4-2 Propose solutions about shellfish contamination and toxin accumulation</p> <p>4-2-1 Monitor shellfish contaminants and toxin accumulation</p> <p>4-2-2 Transmit the results of monitoring and the countermeasures to the organs concerned</p>			

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>5-1 Consider the freshness improvement policy of fisheries products</p> <p>5-1-1 Understand the present condition of the freshness of captured products</p> <p>5-1-2 Consider the standardization of the quality</p> <p>5-1-3 Examine the handling method of captured products onboard</p> <p>5-1-4 Examine the improvement of fishing methods.</p> <p>5-2 Transfer new technology to the fishermen in order to improve the freshness of fisheries products</p> <p>5-2-1 Elaborate educational materials</p> <p>5-2-2 Promote fisheries organizations to accept the new handling methods</p> <p>5-2-3 Hold the workshops for the fishermen</p> <p>5-3 Investigate the improvement situation in the quality control</p> <p>5-3-1 Evaluate new technology and implementation process</p> <p>5-3-2 Recommend to the Ministry of Health the establishment of national policies on quality control</p> <p>5-4 Instruct the quality control in fisheries communities.</p> <p>5-4-1 Incorporate the involved institutions in the training plans through the CDCGN</p>			

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>6-1 Consider the freshness improvement policy in a circulation stage</p> <p>6-1-1 Investigate and evaluate the present condition of the freshness in a circulation stage</p> <p>6-1-2 Improve handling methods</p> <p>6-1-3 Evaluate the improvement of handling methods</p> <p>6-2 Train traders</p> <p>6-2-1 Hold workshops for traders</p> <p>6-2-2 Elaborate educational materials</p>	<p>INPUT</p> <p>Japanese side</p> <p>Long-term experts</p> <p>Leader /fisheries policy Coordinator</p> <p>Quality control</p> <p>Resources management</p> <p>Short-term experts</p> <p>Equipment provision</p> <p>C/P training</p>	<p>Costa Rican side</p> <p>C/P</p> <p>UNA (Puntarenas)</p> <p>INCOPECA</p> <p>Place, office, center for research (Punta Morales) (Puntarenas) (San Jose)</p> <p>Operating budget assigned</p> <p>UNA , INCOPECA</p>	<p>Previous Conditions</p> <p>Institutions cooperate in the project</p>

ANNEX 11 (1) Plan of Operation (Resources Management)

Out put	Activity (Big item)	Activity (Small item)	Content of Activities						Implementing Organizations	Responsible Organizations	
				1	2	3	4	5			
1.A fisheries resources management plan is drawn up appropriately	1-1 Elaborate the plan of activities										
		1-2 Understand the actual condition of fisheries	1-2-1 Investigate landing situations (size, species, seasonal variation)	Examine on the conditions of landing sites (Circulation system, setting of the prices, etc.)						UNA, INCOPECSA	INCOPECSA
		1-2-2 Investigate fishing gears and methods	1-2-2 Investigate fishing gears and methods	Investigate on fishing gear and methods, operation season and time, etc.							
		1-2-3 Examine fishing gear selectivity and environmental impact	1-2-3 Examine fishing gear selectivity and environmental impact	Examine on the impact to the environment by the fishing gear and methods (Destruction of environment, etc.)							
		1-2-4 Evaluate new fishing methods	1-2-4 Evaluate new fishing methods	Investigate on fishing amount, fishing efficiency, selectivity of species, age, size, etc. in new fishing methods							
		1-2-5 Investigate the structures of fishery communities	1-2-5 Investigate the structures of fishery communities	Investigate on life situation of fishermen (working time, income, educational condition of their children, etc.)							
				Investigation on the structure of fishery communities							
		1-3 Evaluate the resources of fishing species and exploitable species	1-3-1 Fix landing statistics	Fix the statistics of fisheries products at landing sites of the Gulf of Nicoya							
			1-3-2 Conduct ecological investigation of species utilized and exploitable species	Investigate on nursery ground by releasing tagged species, stomach contents, migration pattern, etc.							
				Estimate spawning periods of most important species by weighing their gonads and so on							
			1-3-3 Examine the biology and reproduction forms	Estimate sustainable fishing amount by measuring body length and weight, counting holding eggs and examining age composition of fished species							
			1-3-4 Build a database of resources evaluation	Evaluate resources by using accumulated data							
			1-3-5 Evaluate the resources of species utilized and exploitable species	Investigate periodically on fishing amount, age, size, etc. of fished species							

2. The fisheries resources management plan is appropriately implemented	1-4 Elaborate the plan of resources management																									UNA, INCOPEECA	UNA			
	1-5 Discuss on the plan in the organs concerned	1-5-1 Check the plan	Review periodically the contents of the resource management plan																							UNA, INCOPEECA	INCOPEECA			
	2-1 Make it well-known to the fishermen the resources management concept	1-5-2 Coordinate with other organizations concerned through the cooperation with CDCGN	Hold a meeting of the CDCGN in 2 or 3 months interval to discuss on activity reports and future activities																								UNA, INCOPEECA, CDCGN	INCOPEECA		
			2-1-1 Create educational materials	Elaborate simple educational materials for fishermen																							UNA, INCOPEECA	UNA		
			2-1-2 Promote fishermen's organization	Hold a meeting periodically with the representatives of fishermen's associations to discuss on the resource management of the Gulf of Nicoya																								UNA, INCOPEECA	INCOPEECA	
			2-1-3 Hold workshops for fishermen.	Carry out a workshop (lecture or training) periodically for fishermen																									UNA, INCOPEECA, CDCGN	INCOPEECA
			2-2 Manage the artisanal fishery organizations	2-2-1 Watch the activities of the illegal fishery	Periodical questionnaire and field observation are carry out																								UNA, INCOPEECA	UNA
			3. The fisheries resources management plan is periodically updated		2-2-2 Design and suggest the supporting system for the fishermen	Elaborate document, hold meeting and support technically																								UNA, INCOPEECA
	3-1 Monitor fishing activities				Inquire of fishermen periodically whether they are performing fishery activities based on the resource management plan																								UNA, INCOPEECA	INCOPEECA
	3-2 Monitor fisheries resources				Examine on fishing amount and size of fished species to compare with the past data																								UNA, INCOPEECA	INCOPEECA
	3-3 Investigate the enforcement situation of the plan				Examine the resource management plan based on the results obtained																								UNA, INCOPEECA	UNA
		3-4 Discuss on the revision of the plan in the organs concerned		Improve the plan after the discussion on the above-mentioned results																								UNA, INCOPEECA, CDCGN	INCOPEECA	

Plan of Operation (Quality Control)

Out put	Activity (Big item)	Activity (Small item)	Content of Activities						Implementing Organizations	Responsible Organizations
				1	2	3	4	5		
4. A safety improvement policy of shellfishes is drawn up	4-1 Grasp the present condition of shellfish contamination and toxin accumulation	4-1-1 Fix the data of the past shellfishes	Fix the data of the past (UNA, MAG and INCOPECSA)						UNA INCOPECSA (CMR)	UNA
		4-1-2 Analyze the contaminants of shellfishes	Analyze toxic substances (arsenic, cadmium, lead, mercury)						UNA; INCOPECSA (MAG)	UNA
		4-1-3 Analyze the shellfish toxins caused by red tide	Count the number of the toxic phytoplankton in seawater of 6 stations (Muelle Puntarenas, Punta Molares, Tarcoles, Isla de San Lucas, Isla de Cedros, Isla de Chira)						UNA INCOPECSA (CMR)	UNA
	4-2 Propose solutions about shellfish contamination and toxin accumulation		Investigate on the toxin of shellfish by means of mouses						UNA (MAG)	UNA
			Culture the toxic phytoplankton and investigate on the level of toxicity						UNA	UNA
		4-2-1 Monitor shellfish contaminants and toxin accumulation	Establish the standard number of phytoplankton and accumulated amount of toxin in the flesh of mollusks						UNA; (MAG) (MS)	UNA
5. A freshness improvement policy of fisheries products is spread	5-1 Consider the freshness improvement policy of fisheries products	4-2-2 Transmit the results of monitoring and the countermeasures to the organs concerned	Discuss periodically with MAG and the Ministry of Health						UNA; INCOPECSA (CMR)	INCOPECSA
		5-1-1 Understand the present condition of the freshness of captured products	Design contingency program for intoxication risk in coordination with other institutions						UNA; (CMR); (CDCCGN)	INCOPECSA
	5-1-2 Consider the standardization of the quality		Examine the freshness of fished products (sensory, physical, bio-chemical and microbiological methods)						UNA	UNA
			Freshness evaluation of captured products by organoleptic test						UNA	UNA
			Establish the physical, bio-chemical and microbiological standards for the captured products						UNA	UNA INCOPECSA
		5-1-3 Examine the handling method of captured products onboard	Characterization and documentation on the handling of captured products on board (freshness, quality, sanitary, handling, etc.)						UNA INCOPECSA	UNA INCOPECSA
		Determine the handling practices effects on the fisheries products quality using the microbiological, physico-chemical parameters						UNA	UNA	

	<p>5-1-4 Examine the improvement of fishing methods</p>	<p>Determine the improvement methods to ensure the quality according to the fishing methods</p> <p>Develop technologies to improve the freshness</p> <p>Develop a quality inspection system on board</p>	<p>UNA INCOPECSA</p> <p>UNA</p> <p>INCOPECSA</p> <p>UNA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>INCOPECSA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>UNA</p> <p>UNA</p> <p>UNA INCOPECSA</p> <p>CDCGN UNA INCOPECSA</p> <p>UNA INCOPECSA</p>
<p>5-2 Transfer new technology to the fishermen in order to improve the freshness of fisheries products</p>	<p>5-2-1 Elaborate educational materials</p> <p>5-2-2 Promote fisheries organizations to accept the new handling methods</p>	<p>Prepare the text that the fishermen can understand</p> <p>Carry out periodically the exchange of opinion with fishermen</p> <p>Inform about the importance of fish quality to the fishermen</p> <p>Promote the new technologies using radio and television sets</p> <p>Publish bulletin information</p> <p>Training of fishermen is executed</p> <p>Train public servants</p>	<p>UNA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>INCOPECSA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>UNA</p> <p>UNA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>UNA</p> <p>UNA INCOPECSA</p>
<p>5-3 Investigate the improvement situation in the quality control</p>	<p>5-3-1 Evaluate new technology and implementation process</p> <p>5-3-2 Recommend to the Ministry of Health the establishment of national policies on quality control</p>	<p>Examine the present status of freshness and quality of the products. (organoleptic test, sanitary check, bacterial examination, etc.)</p> <p>Discuss with the related institutions the establishment of national policies on the quality control in order to improve the freshness</p>	<p>UNA INCOPECSA</p> <p>UNA INCOPECSA</p>
<p>5-4 Instruct the quality control in fisheries communities</p>	<p>5-4-1 Incorporate the involved institutions in the trainings plans through the CDCGN</p>	<p>Instruct the quality control as a model in several communities</p>	<p>UNA INCOPECSA</p>
<p>6. The freshness improvement policy of fisheries products in a circulation stage is spread</p>	<p>6-1 Consider the freshness improvement policy in a circulation stage</p>	<p>Examine the present status of freshness and quality of the products. (organoleptic test, sanitary check, bacterial examination, etc.) in a circulation stage</p> <p>Decide the improvement methods from the above mentioned results</p> <p>Monitor the fisheries products freshness through the sensory, physycal, chemical and microbiological methods</p>	<p>UNA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>UNA INCOPECSA</p>
<p>6-2 Train traders</p>	<p>6-2-1 Hold workshops for traders</p> <p>6-2-2 Elaborate educational materials</p>	<p>Execute the training workshops for the traders</p> <p>Hold the seminar for commercials on the basic knowledge of quality and sanitary management</p>	<p>UNA INCOPECSA</p> <p>UNA INCOPECSA</p> <p>UNA</p> <p>UNA</p> <p>UNA INCOPECSA</p> <p>UNA INCOPECSA</p>

資料3 プロジェクト・ドキュメント (和文)

プロジェクト・ドキュメント

コスタ・リカ

ニコヤ湾持続的漁業管理プロジェクト

2002年7月

ナショナル大学、コスタリカ水産庁

国際協力事業団

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1. 序説

1.1. 要請の背景

コスタリカ国沿岸漁業は、乱獲、海洋汚染により近年資源の減少が懸念されているが、特に同国有数の漁場であるニコヤ湾では、かつては（1960年代）全国総漁獲量の60%近くを占めていたにも拘わらず、今日ではその資源を減少させている（1997年全国総漁獲量21,569トン、ニコヤ湾漁獲量2,584トン）。

ナショナル大学（UNA）の海洋生物研究所（EBM）はニコヤ湾内域に位置しており、今般、ニコヤ湾の海洋生物資源の持続的な利用を行うにあたり、環境と調和した生物生産の技術と効果的な水域の利用方法を習得する必要性からプロジェクト方式技術協力の要請をしてきた。

1.2. これまでの日本の対応

(1) 第1回短期調査（2001年2月）

要請の背景及び内容をより詳細かつ正確に把握し、プロジェクトの国家開発計画における位置付け、同国の実施体制、プロジェクトの実施の可能性を確認した。

(2) 第2回短期調査（2001年9月）

PCM合同ワークショップを開催し、協力内容についての基本計画を策定した。

(3) 第3回短期調査（2001年11月）

協力の範囲、プロジェクトの具体的活動計画、実施体制等についての補足調査、協議を行い、フレームワークの確認を行った。

(4) 実施協議調査（2002年1月）

これまでの調査結果を踏まえたプロジェクト・ドキュメント（案）に基づき、当該計画実施のための最終的な協議を行い、討議議事録（R/D）の署名を行う。

1.3. プロジェクト概要

プロジェクト目標は、「持続的な漁業システムが構築される」とし、適切な資源管理計画の策定、実施、評価、フィードバックの一連のサイクルを通じ、持続的な漁業が行われることによって、中長期的には「零細漁民の生活収入の向上」が行われることを視野に入れている。

持続的な漁業を目指して各機関がそれぞれの責務に応じて活動するためには、漁業システムが構築される必要があるが、ここで言う漁業システムとは、次の4項目を含んでいる。

(1) 現状の資源を評価した科学的データを基に、適切な漁業管理計画を作成し、この計画を適用し、更新すること

(2) 水産物の安全性向上のための方策が検討されること

(3) 漁獲物の鮮度向上及び流通段階における水産物の鮮度向上の方策が普及されること

(4) 水産物品質への興味が高まること

1.4. 妥当性及び実施意義

本プロジェクトは、漁業資源管理と漁獲物の品質管理によってニコヤ湾に持続的な漁業システムを構築することを目標としており、これは、コスタリカ農牧業開発計画（1998年～2002年）に含まれる「水産分野の開発と持続的生産」方針に合致している。また、同湾における持続的な漁業システムの構築を行うにあたり、各関係機関との関係構築が必要不可欠であるが、本プロジェクトを通じ、UNA、INCOPECA、CDCGNとの関係が構築されるため、自立発展性の観点からも実施意義が高いと思料される。

2. プロジェクト実施の背景

2.1. 当該国の社会情勢等

2.1.1. 政治情勢

大統領を元首とする立憲共和制。大統領および国会議員（一院制）の任期は各々 4 年で、国民の直接選挙により選出されている。大統領は再選禁止、国会議員は連続する任期での再選禁止。コスタリカは中米で最も政治的に安定している国のひとつで、軍隊が存在せず文民政治の伝統が守られていること、教育水準が高いこと（非識字率約 6.5%、1999 年、出典：教育省統計局）、貧富の差が比較的小さいこと、保守的な国民性であること等が当国の特徴である。外交に関しては、伝統的に対米友好、平和善隣、人権尊重を掲げ、国連米州機構を中心に極力全方位外交を目指している。

2.1.2. 経済情勢

1980 年代初め、当国経済は累積債務不履行問題をきっかけに、高いインフレ率と失業率、マイナス成長を伴う経済危機に至った。この危機に対し、IMF 及び世銀の処方箋を積極的に受け入れ、従来の開発戦略であった輸入代替工業化路線を捨て、構造調整を実施した。1983 年～1997 年の間の経済成長率は第二次産業と第三次産業の好況が幸いして 4%余であった。中米諸国の中で最も雇用率の高い国の一つといわれてきたが、失業率が 1993 年には 4.1%であったところ 1997 年には 5.7%と、近年では雇用状況にかげりが出てきている。特にカリブ海及び太平洋沿岸部の雇用率は全国平均より低いことが特徴である。

2.2. 対象セクター全体の状況

2.2.1. 漁業事情一般

2.2.1.1. 沿岸・沖合漁業

コスタリカの漁獲漁業は、統計的には沿岸漁業及びマグロ漁業に大別されている。ただし統計の沿岸漁業とは、自国漁船による漁獲全てを指すもので、沖合漁業による漁獲も含まれる。一方、マグロ漁業の統計は、コスタリカでマグロ漁業を行っているのは外国船しかないことを示している（1999 年のマグロ水揚げ量：約 2 万 7 千トン）。沿岸・沖合漁業は零細及び企業（Semi-industrial）漁業者によって行われており、近年の全国総漁獲量は年間約 2 万トンであるが、その 98%が太平洋沿岸の水揚げで占められ、カリブ海沿岸の水揚げ量は僅か 400 トン前後に過ぎない。沿岸・沖合漁業の主体は Artisanal Fishery であり、水揚げの 80%以上が Artisanal Fishery によって揚げられている（表 1）。また、コスタリカの海産物の 70%はプンタレナスに水揚げされている。

表 1. 漁業経営別沿岸・沖合漁業生産量（太平洋沿岸） (MT)

Category	1997	1998	1999
Shrimp Fishery	3,342 (15.8%)	2,824 (15.8%)	3,817 (18.5%)
Artisanal Fishery	17,806 (84.2%)	15,087 (84.2%)	17,191 (81.5%)
Total	21,148 (100.0%)	17,911 (100.0%)	20,008 (100.0%)

(Informe de Labores 1999 - 2000, INCOPECSA)

2.2.1.2. 零細漁業

コスタリカで Artisanal Fishery と呼ばれている漁業は次の 3 種類に分類されている；

- (1) 小型 Artisanal Fishery (3 海里以内の漁業)
- (2) 中型 Artisanal Fishery (3 海里から 40 海里内の漁業)
- (3) 進歩した Artisanal Fishery (40 海里以上での漁業)

今後このドキュメントで述べる「Artisanal Fishery は (1) 小型 Artisanal Fishery のことで、零細漁業を意味するものとする」。したがって、零細漁業者或いは零細漁民は 3 海里以内で小型 Artisanal Fishery を行っている者のことを言う。

コスタリカの水産物需要を賄ううえで最も重要な役割を担っているのが零細漁業であり、漁業従事者の 85% が零細漁民に属しているとされる。零細漁業は 3 日以内の操業で主に「panga」、「bote」、「lancha」と呼ばれる船外機船（船長が 6m 前後）によって行われている。漁具は刺網、小型延縄、手釣りを主体としている。太平洋沿岸には 50 以上の漁村があるが、零細漁業者は一般に低所得、教育水準が低い、居住環境が貧しいといった特徴をもち、劣悪な生活環境により健康状態も脅かされているとされる。

2.2.1.3. 企業漁業

企業漁業 (Semi-industrial) として分類されている漁業は、エビトロールおよびイワシ巻網であり、73 隻の登録漁船は全て Puntarenas を基地に操業を行っている。漁業者は船主団体である UNIPESCA あるいは Camara Puntarenas de Pescadores に所属しているが、延縄漁船は独自の協会を持っている。延縄船の場合、操業日数は、大型船 (75~80 フィート程度) で最長 2 ヶ月程度、中型船 (40 フィート程度) で 12 日~15 日間であり、エビトロール船の場合は 15~20 日間程度である。エビトロールによる混獲魚は、商品価値の高い魚種であれば Puntarenas に水揚げされているが、商品価値がないものは一部餌として利用する場合もあるものの大部分は海上で投棄されている。

2.2.1.4. 養殖事情

コスタリカではティラピア、エビ、ニジマス、オニテナガエビ、Piangua について事業的に養殖が行われており、Piangua を除く 1999 年の生産量は 9,324 トンであった (表 2. Piangua の養殖は最近行われるようになったばかりで、統計には組み込まれていない)。

表 2. コスタリカの養殖生産量 (トン)

魚種	1997	1998	1999
ティラピア	4,817.0	5,346.0	6,588.0
ニジマス	152.0	104.0	181.0
エビ	2,404.0	2,348.0	2,465.0
オニテナガエビ	78.5	86.6	90.0
合計	7,451.5	7,884.6	9,324.0

(Informe de Labores 1999-2000, INCOPECA)

養殖用に開発された土地面積は、1997 年の 944ha から 1999 年の 1,522ha へと 1.61 倍に増加した。養殖面積が増えている背景として、酪農不振、塩の価格低迷などによる酪農や塩田事業からの養殖事業への参入増加が挙げられる。1999 年の養殖事業者数は 772 件で、ティラピア養殖事業者数が 583 件と全体の 75.5% を占めている。INCOPECA は Ca as、Guapiles、San Carlos および Cerro de la Muerte の 4 ヶ所にステーションを持ち、養殖振興にあたっている。1999 年の種苗生産量は合計 1,612,233 尾、販売価格は 20,495,265 コロンであった。養殖対象種はティラピア、オニテナガエビ、ニジマスおよびエスカルゴで、海面養殖は行っていない。

2.2.2. ニコヤ湾の零細漁業

零細漁民によるニコヤ湾のエビ漁業は湾内全域で行われているが、特に主要河川の流入による堆積泥が多い北岸沿いが主要漁場となっている。漁具は刺網で、仕様はモノフィラメント、3.5 インチ目、深さ約 1.5m、長さ約 183.2 X 2m である。漁船は FRP の船外機船、長さ約 6m の船が主体であり、無許可船を含め約 2000 隻余が操業していると推定される。刺網一反／漁船で日帰り操業されており、副産物としてニベ (Corvina) などが混獲されている。フエダイ (Pargo) の主漁場は Negritos 島周辺、ニベ (主要 3 種) は湾内全域であり、特に Torro 島から Chira 島までは 3.5 インチ目の刺網、Chira 島から Caballo 島にかけては 5～6 インチ目の刺網、80 針程度の小型延縄などにより漁獲されている。ハタ、バラクーダ等は Tarcoles 河口地先で漁獲されている。ニコヤ湾周辺には Chomes、Fila Pajaros、Manzanillo、Isla Chira、Isla Venda、Isla Caballo、Tarcoles など約 20 余の漁村が存在する。ニコヤ湾で操業している零細漁業者数は推定約 3,500 人で、彼らは一般に教育レベルが低く、収入が少ない、生活基準が貧しいといった特徴をもっている。

2.2.2.1. ニコヤ湾における漁獲生産

ニコヤ湾の漁業生産は減少傾向にあり、1985 年から 1995 年までの間に 5360 トンから 2800 トンに、約 48% 減少している。ニコヤ湾の 1990 年から 1997 年までの種類別平均漁獲量は 3401.9 トンである。その内訳は表 3 のとおりである。

表 3. ニコヤ湾の平均漁獲量 (1990 - 1997)

漁獲種類	漁獲量 (MT)
魚類	2855.2 (84.0%)
エビ類	516.8 (15.2%)
イセエビ	1.2 (0.03%)
貝類	24.0 (0.7%)
その他	4.6 (0.1%)

(INCOPECSA)

(1) 魚類の生産量

魚類生産量の 60% は Primera pequena (784.1t, 23.0%)、Chatarra (638.3t, 18.8%)、Sardina (597.8, 17.6%) と呼ばれる小魚である。なお、Primera pequena といわれる魚種は小型のニベ類で、Chatarra はいろいろな魚種の混在する雑魚、Sardina はサツパ類の一種である。ニコヤ湾では 320 種類の魚類が同定されており、うち 145 種類が漁獲されている。商業的に重要であるとされているのはそのうち約 25 種である。

エビトロールによる副産物

ニコヤ湾におけるエビトロールによる混獲魚の 30% はニベ類 (Scianidae の魚種) で漁獲個体数の 26.3% を占めている (Gamboa, 1992)。また、6 種類は第 1 カテゴリーと呼ばれる成魚で、漁獲個体数の 21.1% を占めている。個別別に最も多い種類は、el bobo (*Polydactylus approximans*, 16.7%)、el roncador (*Haemulopsis leuciscus*, 15.4%)、las corvinas (*Cynoscion reticulatus*, 9.1% 及び *Micropogonias altipinnis*, 7.0%) である。

(2) 甲殻類の生産量

ニコヤ湾では甲殻類全体で 243 種類が報告されていて、エビ類が 79 種類、カニ類が 163 種類、イセエビは 1 種類である。商業的に関心をもたれている種類は 18 種類あり、中でも Camaron blanco と呼ばれている *Litopenaeus occidentalis*, *L. stylirostris*, *L. vannamei* が、最も重要な種類である。

(3) 軟体類の生産量

採貝による貝類生産の90%以上は Piangua (サルボウガイの一種) である。ニコヤ湾では 485 種類の軟体類が報告されている。253 種が腹足類、229 種が二枚貝類、3 種類が頭足類 (イカ 2 種、タコ 1 種) である。商業的に重要な種類は二枚貝で 6 種、頭足類 3 種、および腹足類 1 種である。FAO で摂食可能とされている 48 種類以上の軟体類は、ニコヤ湾でもおそらく生息しているものと思われるが、これらの種類の個体群に関する情報がないし、その分布や生息量に関する研究もなされていない。

2.2.3. 水産物の市場・流通

2.2.3.1. 市場・流通の現状

コスタリカの特長事情として、仲買業者や水産会社が独自の水揚げ施設を持っており、零細漁業者が漁獲物を仲買業者に販売する際には、個々の仲買業者の水揚げ桟橋に接岸して相対で取引されていることが挙げられる。また、San Jose や Heredia など Central Valley で販売される水産物は、公共の消費地市場である CENADA (国内流通の 30~35% が取り扱われている) で取引されることが法で定められている。コスタリカの水産物流通には地場消費型、San Jose 周辺の大消費地に向けた国内流通型および輸出型の 3 つの典型的なパターンが存在する。

輸出型には、産地仲買業者が水産物を集荷して輸出業者に販売する場合と、輸出業者が産地に水揚げ施設を持ち、漁業会社との契約により原魚を仕入れている場合とがある。主な仕入先は Puntarenas、Quepos、Golfito などである。零細漁民から仕入れることもあるが、大部分は契約漁業会社から原魚を仕入れている。加工魚のほぼ全量は輸出される。輸出先は主に米国で、ヨーロッパ向けエビも取り扱っている。米国向け鮮魚は梱包に保冷剤を入れて空輸、冷凍品は船舶により海上輸送している。米国、ヨーロッパから HACCP に基づく品質検査官による査察を受けており、過去に改善命令を受けたことはあるが、禁輸措置までとられたことはない。また、自主検査として、入荷毎に MAG 等の検査機関に依頼して細菌やヒスタミン等の検査を実施している。

表 4. 水産物の輸出入 (1999 年)

	kg	US\$
Total export	35,656,507.00	140,889,771.00
Export via Aduana Santamaria	7,111,457.51	49,823,047.73
Total import*	33,000,000.00	32,000,000.00

* Preliminary

(Informe de Labores 1999-2000, INCOPECSA)

2.2.3.2. 市場流通に係る改善計画

生産者価格が安く消費者価格が高いため、CNP (国家生産物評議会) では仲買業者 (の影響) を減らすことが必要であるとしており、その方策として以下を考えている。

- (ア) Puntarenas に大きな卸売市場を建設する。必要な費用は 120 万ドル。
- (イ) Puntarenas の漁業組合と共同して CNP の指定する場所に漁師が漁獲物を水揚げするよう調整する。
- (ウ) 漁業組合が大口消費者に直接出荷する。
- (エ) 週末の市場に漁師が出店する。

INCOPECSA の市場課は CENADA に対して HACCP の適用に伴う品質検査と鮮度管理技術などの技術支援を行う。また、生産者価格と消費者価格の格差を是正することを主な調査目的として市場調査を行う計画を持っている。この調査は INCOPECSA と漁業組合が提案

するもので、CNP が費用を負担し、民間調査会社に委託する形で行われる予定である。

2.3. 当該国政府の戦略

水産分野の開発と持続的生産に係る政府方針は、具体的には 1998 年～2002 年を実施期間とする農牧業開発計画に含まれる INCOPECSA 担当の事業計画に示される。この計画には経済分野 31 件、社会分野 3 件、環境分野 3 件、合計 37 件のプロジェクトが含まれている。経済分野では、INCOPECSA の組織強化、漁業養殖統計の INFOAGRO への統合、効率的な漁業技術の普及、漁業支援施設建設（Puntarenas, Caldera, Golfito, Quepos, El Coco, Guajiniquil）、棧橋建設（Tarcoles, Costa de Pajaros, Chomes, Puerto Thiel, Barra del Colorado）、漁業者融資、銀行融資支援、燃油費補助、水産養殖訓練、水産養殖業者組織化促進、流通機構整備（制度面）、水産物品質改善の啓蒙、HACCP 訓練、水産物品質改良技術の普及と支援、民間投資に向けた調査計画策定、水産養殖調査体制の強化、大学との調査プロジェクトに係る協約実現、水産養殖の調査計画と技術移転（PITTA）に係る計画の策定実施、混獲魚利用研究、養殖試験場の技術移転と種苗生産強化、海面養殖（4 種）施設設置の促進（DRIP や漁業者組織との協約）などのプロジェクトが見られる。社会分野では、漁業者の保険年金制度への加入、IMAS との協調による禁漁時の社会保障など、また環境分野では、漁業資源開発の規制、資源環境保全にかかる他機関との協調などが含まれる。

2.4. 過去・現在に行われている政府、その他団体の対象分野関連事業

海洋生物分野への主要な援助として、ドイツ（Hannover 大学との人的交流と技術支援）、オランダ（Wageningen 大学、アムステルダム大学との共同研究、政府からの資金・機材供与等）、米国（交換留学生）、日本（漁業・養殖分野への技術協力）等が挙げられる。水産分野に関連のある最近の主要プロジェクトとしては下記の 6 つが挙げられる。

(1) Development of Aquaculture 1989～2003 年（オランダ）

オランダの Wageningen 大学が支援する UNA-LUW プロジェクトは現在延長 3 回目に当り 2003 年に終了。これ以上の延長は望めないとされる。この援助は、かつては Ecotrophic モデル開発、フェダイ養殖関連の技術援助、HACCP 関連の研究機材の供与など多分野にわたっていたが、現在の援助内容は研究所所属の修士 3 名、博士 1 名に対する学資援助と学位取得のための研究費補助に留まっている。

第 I フェーズ：水産養殖（淡水養殖）1989 - 1994 : US\$800,000

第 II フェーズ：海面養殖、漁業、淡水養殖、研修、基礎コース等 1994 - 1999 : US\$700,000

第 III フェーズ：淡水及び海水養殖、基礎コース、底魚漁獲 P/J2001 - 2003 : US\$113,000

(2) 交換留学制度 1999 年～（米国）

半年に 15～20 人の学生を受け入れ、2 名の教員を米国で養成するプログラム。

(3) Piangua 養殖 1999～2002 年（米国）

USAID/CRUSAF: Costa Rica USA Found によるプロジェクト

Morales の婦人会を対象：UNA に US\$10,000

(4) Piangua 資源の利用とエコツーリズム 2000～2002（UNDP）

Chira の婦人会に対して：US\$20,000

(5) カキとその他の貝類資源の利用 2000～2002（UNDP）

Morales の婦人会に対して：US\$20,000

(6) Piangua とその他の貝類の養殖 2001～2003 (米国)

USAID/CRUSAF: Costa Rica USA Found によるプロジェクト

Chira 島の漁業婦人会を対象：UNA に US\$10,000

3. 対象開発課題とその現状

3.1. 当該対象課題の制度的枠組み

3.1.1. 国家開発計画

コスタリカ政府は 21 世紀に向けて環境と調和しつつ持続的な開発を目指すことを理念とする国家人材開発計画 (PNDH、1998～2002 年) を推進している。同計画は貧困の減少、より良い雇用機会の創出、農業及び地域社会開発、産業基盤の整備、教育機会と質の改善、環境保護と適正な利用等を目的に、人材の育成ひいては平等な社会的、経済的向上を計ることを目指すものである。各省庁では以上の基本理念に基づいて開発計画が作成されている。自然環境の保全に係る行政は環境エネルギー省 (MINAE) が管轄しており、森林、湿地帯、マングローブ域にかかる調査研究とともにこれらの自然界の保全に努力が注がれている。農牧省 (MAG) では農牧業開発計画 (1998～2002 年) が策定され、水産分野の開発計画はこの農牧業開発計画の一部として作成されて、経済、社会、環境の各分野に分けて、行政、漁業、養殖業基盤施設等にかかる具体的な実行計画が示されている。

3.1.2. 対象課題関連機関

水産行政は INCOPECSA (コスタリカ漁業養殖機関、後述) によって行われているが、対象課題である資源管理や品質管理に係る調査研究は、施設や人材面で INCOPECSA だけでは対応しきれないところがあり、農牧省や大学等の政府あるいは学術組織と連携して実施されている。また、環境保全と産業開発に係る各種のプロジェクトの実効性を高めようとして、ニコヤ湾開発保全委員会が組織されている (後述)。この委員会は、政府機関、自治体、学術組織に加えて、観光協会や漁業者組織などニコヤ湾での産業開発に関与する組織、及び環境 NGO、住民団体など環境保全に関与する組織からの代表者を委員としている。したがって、カウンターパート機関である UNA (ナショナル大学) や INCOPECSA だけではなく、ニコヤ湾開発保全委員会に所属するこれらの機関による支援あるいは協力が当該プロジェクトの成功に重要な役割を果たすであろうと考えられる。

3.2. 対象開発課題とその現状

コスタリカ国太平洋沿岸中央部に位置するニコヤ湾は、1200 平方キロメートルの広さがあり、沿岸域には約 10 万人の住民がいる。ニコヤ湾には約 3,500 人の零細漁業者がおり、刺網 (60%) と釣り (手釣りや延縄：29%) を主な漁業としている。その零細漁業が当面する問題は過剰漁獲による漁家経営の悪化である。資源の過剰開発によって漁業生産の均衡が失われていることは、以下に示すように、ニコヤ湾の漁獲水準が他地域に比べて極端に少ないことからわかる。一隻当りの漁獲量 (INCOPECSA、1999 年) を比較すると、Puntarenas (ニコヤ湾) では 2.7 トンで、Quepos で 8 トン、El Coco で 29.7 トンといった他所の半分以下の漁獲量しかない。

ニコヤ湾が抱えている問題点は以下のようなものである。

- ・乱獲と開発可能な資源の減少
- ・流域水と養殖池の汚染
- ・代替産業の不足

- ・劣化した水産物の品質
- ・特定種に偏った漁業生産
- ・汚染の結果としての藻の繁殖

これらの問題点をより明らかにし協力の範囲・内容を具体化するため、参加者約 30 名（ニコヤ湾関係者、ナショナル大学、INCOPECSA、INA、その他の関係機関）で PCM 手法によるワークショップが 2001 年 9 月 4 日～7 日に開催された。参加者分析の後、中心問題を「零細漁業者の家計収入が良くない」として問題分析が行われた。中心問題の直接の原因と考えられる問題として次の 4 点が挙げられ、以下のような分析がなされた。

3.2.1. 「漁業の代替産業がない」

・ 代替する雇用がない

代替産業として考えられるものに観光、養殖、水産加工が考えられるが、ニコヤ湾には観光の目玉となるものがなく、養殖業といっても海面養殖では企業によるエビ養殖は行われているものの、零細漁業者ができるような海水魚の網生簀養殖は行われていない。海水魚の網生簀養殖を行うには大量の種苗が必要となるが、大量種苗生産を行えるような施設がないし、その知識も技術もない。水産加工に関しては、ある加工会社が UNA と共同で、家族単位でできるさつま揚げやつみれを作って市場で販売してみたが、魚食習慣があまりないためか、全く売れなかったということである。

3.2.2. 「零細漁民は貝を採っていない」

・ 貝類採取が禁止された

2000 年末に赤潮が大量発生し、採取された二枚貝を食べた漁民に中毒が起こったり死者が出たりしたため、以降貝類の採取が全面的に禁止されている。採貝禁止は、2000 年 12 月 26 日の政府広報 No. 29184-s-MAG により交付された。最近の貝毒中毒による被害状況は次のようである。1989 年：中毒 9 人と死者 1 人、1990 年：死者 2 人（いずれも子供）、2000 年 11 月～2001 年 10 月：中毒 54 人。

3.2.3. 「魚介類が減少している」

魚介類の減少は、乱獲による水産資源の減少に基づいているが、その原因として以下のような問題点が挙げられる。

・ 漁業者が増大している

農業への集約化が進むとともに、主要輸出農産物であるバナナやコーヒーの国際価格が暴落している（EIU-The Economist Intelligence Unit, Country Profile 2001）ことから農業から漁業へ転向するものが多く、結果として漁業者人口が増えている。

・ 不法漁業者がいる

上述のように漁業許可数が制限されているにも拘らず、漁業者が増えているので不法漁業者が出るのはやむを得ない面がある。INCOPECSA の保護登録局によって行われた 2000 年漁業センサスと 2001 年に行われた確認作業によると、漁業許可数及び不法漁業者数は次のようになっている。

- (1) 長さ 10m 以下の漁船による漁業許可保有漁業者数は 1478 人
- (2) ニコヤ湾沿岸で上記漁業許可が発給されている村落は 33 村落
- (3) 漁船分布数は、村落平均で 44.78 隻。Puntarenas は最多で 382 隻、Cedro は最少で 1 隻となっている。

- (4) 2001 年の確認作業によって明らかになった、漁業許可を取得せずにニコヤ湾で漁業を営んでいる不法漁業者数は、表 5 のとおりである。

表 5. ニコヤ湾村落別不法漁業者数 (2001 年)

村落	数	村落	数	村落	数
Isla Caballo	31	Cabo Blanco-Jicaral	12	Cabuya	9
Chacarita	56	Isla de Chira	83	Chomes	29
Cocorocas	12	Colorado	34	Corozal	8
Costa de Pajaros	75	Jicaral	24	Lepanto	22
Mal Pais	6	Manzanillo	52	Cobano	5
Mata Limon	12	Morales	21	Paquera	9
Playa Blanca	17	Pochote	19	Tambor	15
Pto. Jesus	10	Pto. Moreno	20	Pto. Nispero	7
Pto. San Pablo	22	Pto.Thiel	20	Puntarenas	34
San Buenas	13	Tacoles	20	Isla Venado	69
合 計					788

出典：INCOPECA、DGT-254-01 (Director M.Sc. Ricardo Gutierrez V.)

ちなみに、漁業許可には漁船に対する許可と漁法に対する許可があり、以下のようになっている。

(1) 漁船に対する許可 (licencia)

漁業許可の有効期間は一年でほとんどが更新される。小型船 3 海里以内の許可件数は全国で約 1,800 件である。

(2) 漁法に対する許可 (permiso)

ニコヤ湾の漁業規則 AJDI・87-96 には、内湾と中湾における零細漁業に対して漁法別の許可制度が別に設けられている。これはエビ刺網、魚類刺網、釣り漁業・その他の三区分に漁法を分け、合計して 700 件まで許可を発給できるものとする。

・ 漁業規則を守らない

上記のように漁業許可数が制限されていること、また複数のライセンスを持っている漁業者がいるために他の漁業者に与えられる許可数が制限されるということもあって、漁業規則を守らず操業せざるを得ないということのようである。

・ 漁法に問題がある

- 現行法 No.190 は 1948 年 9 月 28 日に制定されたもので、古くて機能していない部分があり、適切な漁業規制施行ができない状態にある。そこで、1998 年 9 月に、INCOPECA の権限を拡大強化することを骨子とした新漁業法の法案が上程され、2000 年に第一次審議会を通過した。この法案が制定されれば、不法な漁法を取り締まることができるものと考えられている。
- 上記の新漁業法が制定されたとしても、現存の水産物の適切な漁獲量を調査する能力がないために、魚種別のモニタリングや資源評価ができていないし、他の開発可能な魚種の研究が不足しているため、結局は適切な漁法による漁業の実施は困難であると思われる。

- ・ 小魚が乱獲されている
上記のように漁法に問題があるため、資源添加途上にある小魚が混獲されている。
- ・ ニコヤ湾には汚染がある
ニコヤ湾には湾最奥部に河口を開く Tempisque 河とセントラルバレー一帯を流域とした Tarcoles 川が流れ込んでいる。Tempisque 河は、流域面積が 5,535km² と湾に流入する河川で最も大きく、流域では米、サトウキビ等の作物が耕作されており、河に化学肥料や農薬が大量に流入するといわれている。また、ティラピア養殖も行われていることから、養殖排水の問題もあるということである。Tarcoles 川は 2,275 km² の流域を持ち、コスタリカで最も産業開発が進んだ流域にあり、最も汚染の進んだ河川とされ、ニコヤ湾口頭部に流入している。セントラルバレーには工業の 80%、人口の 70%、コーヒー豆加工の 80%が集中しており、これらの排水が流入する。これら産業による排水は循環利用などにより軽減傾向にあるが、最近では最もひどいのは生活排水で、垂れ流し状態（下水整備約 20%）であるという。また、Puntarenas 沿岸に河口がある Barranca 川は、これら 2 河川に比べて流域面積は 565km² と少ないが急峻な地形を通るので土砂の流入が多い。陸地の過剰開発もあって、雨季には大量の土砂が流入し、湾内で流入部の色がはっきりと茶色に変わる。
- ・ マングローブの伐採がある
ニコヤ湾は中米中最大の熱帯河口域（1530km²）にある。周辺のマングローブはニコヤ湾の 1%の広さしかないにもかかわらず、そこに生息する生物量の 76%に貢献している（Wolff, M. et al. 1998）。法令ができる以前は、マングローブを伐採してエビ養殖場が造成されたりしたが、今は伐採だけではなく学術研究者の研究活動以外のマングローブ利用は禁止されている。

3.2.4. 「魚介類の値段が安い」

- ・ 水産物の質が低い
漁業者に製品寿命の知識がないことや品質基準がないことにより水産物の取り扱いが悪く、その結果水産物の質が悪くなっている。湾内でニベやフエダイを対象とした延縄漁業や湾外でカマスの手釣りをしていところを実際に観察したが、いずれも氷を積み込んでおらず、取れた魚を板の間に放置していたり、活餌の魚槽に放り込んであったりしていて、あまり品質に気を使っているようには見えなかった。また、湾外で刺網或いは延縄を行って 2 日後に帰港した漁船には氷が積み込まれていたが、氷の入った魚槽に漁獲物が放り込まれているだけで丁寧な扱いを受けていないので、港に陸揚げされる時点で鮮度がかなり落ちていた。実際、零細漁業者によって漁獲される魚類の 20~40%は商品にならないと言われる。
- ・ 湾外からの供給が増大している
表 6 は零細漁業による太平洋沿岸の地区別水揚げ量である。ニコヤ湾内にある Puntarenas の水揚げ量が増加している背景には、湾内の漁獲が不振で湾外へ出漁する漁業者が増加した結果全体として水揚げ量が増加していることがある。

表 6. 零細漁業による地区別水揚げ量 (太平洋沿岸)

(単位: トン)

Fishing Region	1997	1998	1999*
El Coco	10,080 (56.6%)	8,011 (53.1%)	8,173 (51.7%)
Puntarenas	2,584 (14.5%)	3,423 (22.7%)	4,348 (27.5%)
Quepos	2,878 (16.2%)	1,866 (12.4%)	1,924 (12.2%)
Golfito	2,263 (12.7%)	1,787 (11.8%)	1,364 (8.6%)
Total	17,805 (100.0%)	15,087 (100.0%)	15,809 (100.0%)

* Preliminary

(Informe de Labores 1999-2000, INCOPECSA)

Puntarenas の水揚げは主に外洋水域から来る生産物 (シイラ、サメ、カジキ等) のために増加しているが、湾内の漁獲量は反対に減少している。

- ・ 中間業者が価格を自由に設定している
市場の透明性がないことや値段を決定するときの規則がないために、中間業者が漁業者から非常に安く水産物を仕入れている。中間業者が言うには、零細漁業者からの水産物は鮮度が良くないので購入価格が安くなる。一般に水産物の産地価格と消費地価格に 2 倍程度の差があると言われている。
- ・ 魚介類の多様性が不足している
コスタリカでは、水産物の加工製品はエビやイセエビの冷凍或いは生鮮もののほか、魚の冷凍フィレ、缶詰及び塩干品程度しかない。これらはほとんどが輸出向けである。コスタリカ人は魚食嗜好が低く、水産加工物を作る習慣がないのとそれを食べる習慣がないので、結局は魚介類の多様性が乏しいということになる。
- ・ 漁業の操業、維持にお金がかかる
ニコヤ湾内での漁獲が低迷しているため、湾外に出漁する漁業者が増えており、漁場が遠くなるに従い燃料代が多くなるし、湾内と違って漁具の破損、流失等の事故が多くなるので維持費も増加している。漁場が年々遠くなっており、以前は 3 日で揚げた水揚げ量を今は 8 日もかかってやっと達成するといった状態である。
- ・ 消費者一人当りの水産物消費量が少ない
コスタリカでは、動物蛋白源として肉類の消費が高く、水産物の消費は極めて少ない。国民一人当りの水産物消費量は 4.2kg/年 (Rodriguez, J. A. 1999) である。

4. プロジェクト戦略

4.1. 全体的戦略

零細漁業者の家計収入が良くない原因は、単純には漁業者人口の増加に伴う過剰漁獲により資源が減少、その結果として漁獲量が減少し漁業者の収入が減少しているということであるが、問題分析をしてみると上記のようにいろいろな問題が含まれていることが明らかになった。それらの問題を克服するにはどのようなアプローチの仕方があるか、そして実際にプロジェクトを行うにはどのようなアプローチを選択した方がより効果的かを明らかにするために以下のような目的分析を行い、同結果がコスタリカの農牧業開発計画 (1998~2002 年) に含まれる水産分野の政府方針 (開発と持続的生産) に同調するようにアプローチの選択が行われ、プロジェクトが決定された。目的分析の中心目的は「零細漁業者の家計収入が上昇する」とし、次の 6 項目について目的分析が行われた。

4.1.1. 「零細漁業者のための代替産業がある」

海面養殖は零細漁業者が行うことのできる代替産業のひとつとなり得ると考えられることから、零細漁業者が海面養殖を行うための分析が行われた。

- ・ 養殖技術が移転される
養殖技術が開発され、モデル養殖が行われ、技術移転のための専門家が養成されることにより研修を通してインストラクターが養成され、漁民に養殖技術が移転される。
- ・ 種苗が供給される
零細漁業者が行える海面養殖の対象種として考えられるものは、魚類、カキ及びヒオウギ貝である。これらの養殖を行うには種苗の供給が必要であり、そのための種苗生産技術が開発されると同時に種苗生産施設が整備される必要がある。
- ・ 信託基金による融資が可能となる
養殖を開始するための資機材購入の資金が必要であるから、融資制度が整備される必要がある。
- ・ 海域使用に関する許可がある
各養殖形態に応じた海域使用許可が整備されると同時に、環境影響評価も行われる必要がある。
- ・ 海面養殖のための組織が結成される
資機材購入、餌料購入、生産物販売等のためには個人で全てを行うよりもある程度の組織として活動したほうが便利である。

4.1.2. 「零細漁民が貝を採取できる」

採貝が禁止されているのは赤潮の発生が原因と考えられている。従って赤潮のインパクトの緩和と管理ができれば採貝ができると言われている。

- ・ 貝類の漁獲が規制される
二枚貝の毒性の程度が決定されることにより品質が保証される。赤潮プランクトンの生物学や物理化学的研究が実施されることにより毒性のある赤潮に関する知識が増え、予測能力が養成される。水質モニタリングが行われる。現在は、赤潮が大量発生した時だけ、「INCOPECSA が採貝、MAG（農牧省）に持ち込んで分析してもらい、分析結果がコスタリカ赤潮監視委員会に送られ、基準値が4 UR/g を超えている場合は貝毒があると判断され、厚生省に報告される。厚生省はこの報告に基づいて当委員会に採貝を禁止すべきであると勧告し、当委員会はその勧告に従ってINCOPECSA に採貝禁止を実施するように命ずる。」というシステムができています。
- ・ 赤潮の影響を防ぐためのプログラムが実施される
国民への教育と健康関係者への研修が行われる。
- ・ 二枚貝の毒レベルが低下される
二枚貝の解毒メカニズムを解明することにより毒レベルを低下させる。

4.1.3. 「漁獲量が増加する」

漁獲量が増加するためには水産資源量が回復する必要があり、そのためには以下のような項目が重要でとなる。

- ・ 漁獲人口が適正となる
漁獲水産物や有効利用の可能性のある水産物の資源評価を行い、各機関が共同で活動することによって資源管理計画を策定する。この計画に基づいて漁業規制をアップデートすること、そして同時に沿岸域で何らかの雇用創出があれば、漁獲人口が適正な水準になる。2000年4月から17に及ぶ関係機関が所属するニコヤ湾開発保全委員会が活動を開始している。当委員会の資源に関する基本方針は、「漁業資源個体群の継続的評価計画と海面養殖計画を策定し、資源過剰開発に伴う漁業紛争調停に向け漁業コミュニティとともに地域研究を行う。」となっているので、当委員会の役割が非常に重要となってくる。
- ・ 持続的な漁業のための漁具が使用される
適正な網地長（刺網の場合 300m 以内）、網目（同 3 インチ以上）、針数（延縄の場合 250 針以内）を用いた漁業が実施されるように規制と監視を強化する。
- ・ 漁民が資源管理概念を理解する
資源保全の教育研修が普及することによって資源管理概念が理解される。
- ・ 水産資源管理計画が実施される
新漁業法によって、INCOPECSA は近い将来、漁業活動のためだけではなく海面養殖のためにも管理計画を適用できるようになる。

4.1.4. 「魚介類の単価が上昇する」

- ・ 良品質・安全な水産物が供給される
カウンターパートを研修することによって移転される新しい技術を適用すること、そしてその技術がこれらの人々から漁民へと普及することを通して、良品質の魚や魚をベースとした産物が得られる。同時に、品質管理が行われ、調査や漁業者との会話の結果として品質基準が設定される。
- ・ 企業・消費者が良品質の水産物を高く買う
宣伝、講演、ワークショップ等により消費者への教育が行われ、同時に品質管理の厳守が確認されることによって水産物の信頼度が上がり、良品質の水産物が高く買われる。

4.1.5. 「水産物の売上が上昇する」

- ・ 供給が管理される
- ・ 漁師が直接消費者に売る
現在不透明な水揚げ価格の決定が明確になる。
- ・ 水産物の消費が増える
コスタリカ国民に、良品質の魚や加工品をより多く食べる習慣が開発される。これは、地方の人々に水産物加工の研修が実施され、そしてまたラジオやテレビのマス・

メディアを使うことによって行われる。

4.2. プロジェクト戦略

4.2.1. プロジェクト選択

目的分析の結果、4 分野（資源管理アプローチ、品質管理アプローチ、赤潮貝毒アプローチ、養殖アプローチ）についての活動の可能性が確認された。これらのアプローチについて、比較評価表（別添）をもとに、その重要性、裨益対象者数、プロジェクト目標の達成可能性、インパクトの面から比較を行ったところ、

- (1) 資源管理アプローチ：全参加者で重要性が高いと意見が一致
- (2) 品質管理アプローチ：相対的な優先度が高い
- (3) 赤潮貝毒アプローチ：重要であるが裨益対象者が貝類採取漁業者に限定される
- (4) 養殖アプローチ：当面の裨益対象者は少数であり、まずは魚種の選択等を含めたフィジビリティスタディーが必要

との評価であった。特に養殖アプローチでは、種苗生産施設の有無が焦点のひとつとなった。コスタリカ側からは、来年オープン予定である海洋公園（プロジェクトサイトに隣接）の施設の利用も可能性があるとのことであったが、いずれにしても研究レベルの規模を超えるものではなく、代替産業規模での種苗生産は不可能である。

以上の結果とコスタリカ側の優先順位を踏まえつつ協議を行った結果、(1) 品質管理アプローチ（食品の安全性を確認するための分析等を含む）、(2) 資源管理アプローチの 2 分野を統合し、「資源管理と品質管理分野の技術移転をとおして、ニコヤ湾の持続的な漁業システムを構築することを目標としたプロジェクトを実施する」ことになった。本プロジェクトを行うことでニコヤ湾に持続的な漁業システムが構築され、その後持続的な漁業が行われるようになると、将来的には零細漁民の家計収入が上昇するという戦略である。

5. プロジェクト実施体制

プロジェクト実施主体は要請機関である UNA（ナショナル大学）であるが、プロジェクト実施に当って INCOPECA（コスタリカ漁業養殖機関）の参加が不可欠であることから、カウンター機関として参加してもらうことになった。また、ニコヤ湾開発保全委員会はいろいろな機関の調整或いは連係に重要な役割を果たしていることから、当プロジェクト運営上欠かすことのできない機関として合同調整委員会及び運営委員会の一員になってもらった。（別添）

5.1. カンターパート機関の能力

カンターパート機関は、要請機関である UNA（ナショナル大学）と水産行政機関である INCOPECA（コスタリカ漁業養殖機関）の 2 機関から構成される。なお、プロジェクト要請機関が UNA なので、INCOPECA のカンターパートとしての参加は UNA と INCOPECA の間の合意書に基づいている。

(1) UNA

水産分野に関する研究・教育は大学レベルでは UNA の EBM（海洋生物学実験所）と UCR（コスタリカ大学）の CIMAR（海洋湖沼研究センター）が行っている。CIMAR は海洋科学の基礎研究や学術的な研究に力を注いでいるのに対して、EBM は INCOPECA や INA（職業訓練学校）の漁業航海訓練センターと協力して水産分野の応用学的研究や実学を重んじた教育をしている。

EBM にはこれまで JICA 専門家や海外青年協力隊員が何人も派遣されており（別添）、

JICA の技術協力を精通している。

(2) INCOPECSA

INCOPECSA は漁業及び養殖行政の執行機関であり、品質管理と資源管理の技術移転をととした「持続的な漁業システムの構築」というプロジェクト目標を達成するためには、当機関のプロジェクト参加が必要不可欠である。

5.2. カウンターパート機関の概要

5.2.1. EBM (UNA の海洋生物学実験所)

5.2.1.1. EBM 組織概要

EBM はナショナル大学自然科学部 (Facultad de Ciencias Exactas y Naturales) 生物学科 (Escuela de Ciencias Biologicas) の臨海実験ステーションであり、その主施設はコスタリカ特別ファンド (PL480 及び漁業法) により Puntarenas に設けられた。自然科学部の組織図は別添資料に示すとおりである。

EBM は沿岸管理 (Manejo Costero) と海面養殖 (Cultivo Marino) の 2 部門による 9 研究室によって構成される (組織図、別添)。2001 年 2 月時点における常駐教官は 10 名、非常駐教官 (週 2 日間 UNA 本学から派遣) は 6 名であり、その他に品質管理の非常駐教官 1 名 (未確定)、メキシコ留学中の教官が 1 名、チリ留学中の教官 1 名がいる。また、EBM の支援要員は助手 4 名、24 時間体制の警備員 4 名、秘書 1 名、清掃員 1 名である。各研究室と担当教官は表 7 のとおりである。

表 7. EBM の研究室および担当教官 (2002 年 7 月現在)

沿岸管理 (Coastal Management)

研究室	常駐教官	非常駐教官
Phyto-plankton	Lic. Emilia Calvo Vargas (Red tide)	MSc. Roxana Viquez (Marine botany)
Quality Control	Lic. Cristian Fonseca (Quality control)	Lic. Hernan Vargas (Microbiology)
Fisheries Research	Lic. Jose Palacios (Fishery Evaluation) Lic. Alberto Villareal (Fishing methods) Lic. Rosa Soto Rojas (Fishery biology)	MSc. Rigoberto Viquez (Fisheries) Dr. Luis Sierra (Ichthyology)
Computer Science for Fisheries	Lic. Gerardo Zuniga	

海面養殖 (Marine Aquaculture)

研究室	常駐教官	非常駐教官
Water Quality	An instructor from Chemistry field	Dr. Ricardo Jimenez (Water quality)
Shrimp Culture	Dr. Jorge Alfaro (Shrimp culture)	Lic. Nariza Galvez (Aquaculture)
Shellfish Culture		Lic. Rafael A. Cruz (Malacology)
Plankton Culture	Lic. Sidey Arias (Aquaculture)	
Fish Culture	MSc. Jorge Boza (Aquaculture)	
Fishery Extension	MSc. Luis Villalobos	

備考：MBA. Angel Herrera (Natural resource management) はメキシコ留学中

MSc. Farid Tabash (Computer Science for Fisheries) はチリ留学中

5.2.1.2. カウンターパートの配置

本プロジェクトのテーマである品質管理と資源管理のために専門家のカウンターパートとして候補に上がっている教官は表 8 のとおりである。なお、彼らは全て EBM に常駐とな

るが、教官であることから勤務時間の 1/4 は学生の教育にあてられるので、プロジェクトのために捧げられる時間は 3/4 である。

表 8. 専門家のカウンターパート候補者 (UNA)

分野	カウンターパート候補者
品質管理	チーフ Lic. Cristian Fonseca (Quality control) Lic. Emilia Calvo Vargas (赤潮及び貝毒) Lic. Hernan Vargas Brramtes (微生物) 化学分野担当教官 1 名
資源管理	チーフ Lic. Jose A. Palacios (Fishery evaluation) Lic. Rosa Soto Rojas (Fishery biology) Lic. Alberto Villareal (Fishing methods) MSc. Rigoberto Viquez (Fisheries) MSc. Luis Villalobos (Fishery extension) MBA. Angel Hererrea (Resource management 留学中) MSc. Farid Tabash (Fishery evaluation: 留学中)

5.2.1.3. EBM の予算

EBM の予算は生物学科の枠内で計上されている。予算は 1 月 1 日～12 月 31 日までの 1 年間区切りで、前年の 8 月に申請され、決定次第銀行に振り込まれて、1 月 1 日には支出できる体制になっている。EBM の年間予算は近年平均して 140,000,000 コロンである。表 9 は当プロジェクト実施のための 5 年間の予算概算である。

表 9. EBM の本プロジェクトに対する 5 年間の予算概算

(単位：ドル)

支出科目	1 年	2 年	3 年	4 年	5 年
1. 人件費 (フルタイム 4 名及びフルタイムの秘書 1 名分)	64,200	64,200	64,200	64,200	64,200
2. 基本サービス費 (光熱費、通信運搬費、安全対策費)	2,500	2,500	2,500	2,500	2,500
3. 域内旅費	3,580	3,580	3,580	3,580	3,580
4. 船・車輛維持管理費	7,500	7,500	7,500	7,500	7,500
5. 消耗品費	3,000	3,000	3,000	3,000	3,000
6. 船賃借料	4,285	4,285	4,285	4,285	4,285
7. 施設 (事務所及び試験所) 維持費	24,000	24,000	24,000	24,000	24,000
8. 資機材購入費	41,600	41,600	41,600	41,600	41,600
小計	150,665	150,665	150,665	150,665	150,665
合計	753,325				

5.2.1.4. 調査・研究実績

EBM が現在進めている研究プロジェクトは、赤潮による貝毒モニタリング、エビ (*Penaeus* spp.) の生質養殖、フエダイ養殖、Piangua (マングローブに生息する二枚貝、サルボウガイの一種 *Anadara tuberculosa*) をはじめとする貝類養殖、漁獲物の鮮度維持 (HACCP 関連研究を含む)、Ecotrophic モデル開発、重要種個体群ダイナミクス、漁獲選択性漁具の開発研究、ワタリガニ *Callinectes arcuatus*) のカニ肉缶詰加工の研究、太平洋沿岸の生物多様性の研究などである。また、これまで UNA/EBM が行った主な調査研究は下記のとおり

りである。

- Nicoya 湾におけるカキ養殖の展望
- 太平洋沿岸におけるスズキ類の網生管養殖に関する成長比較
- Nicoya 湾の生態系に関する研究
- エビ (*Penaeus* sp.) とティラピアの複合養殖
- フエダイ *Lutjanus guttatus* 稚魚の実験水槽環境下での粒状飼料による成長
- Nicoya 湾における Engraulidae 種 (*Cetengraulis mysticetus*) の生物相に関する考察
- Nicoya 湾におけるフエダイ *Lutjanus guttatus* の生物学的漁獲パラメーターの推定
- 海産エビ類の再生産管理に関する研究
- 沿岸水域における農業用化学品の存在と環境への影響に関する予備的分析
- 水産資源の現状と将来に関する研究
- エビ漁業に関する調査と普及の統合が果たす役割
- 漁業セクターがコスタ・リカ社会及び資源に及ぼす影響に関する考察
- Nicoya 湾の漁村開発に関する研究
- コスタリカの水産セクターが及ぼす社会及び資源への影響
- Nicoya 湾の生態系に及ぼす沿岸水の影響
- Nicoya 湾の社会学的状況に関する研究
- Nicoya 半島の農地に関する歴史的研究
- Jicaral 村を対象とした零細漁業者の組織化
- Nicoya 湾における漁業者組織 (COLOPES) と漁業普及に関する計画
- Nicoya 湾のエビ漁業規制に関する試案
- Nicoya 湾における赤潮及び貝毒蓄積の評価
- *Opisthoneme* sp の資源動態
- Nicoya 湾における手工延縄を使つての漁獲量及び生産量

5.2.2. INCOPECSA

5.2.2.1. INCOPECSA の組織概要

INCOPECSA は 1994 年に各省の外に設けられた水産行政を行う政府機関である。コスタリカでは他の省庁は憲法を設置法としているところ、INCOPECSA は法律 (7384 号) で設けられているが、制度上の違いは特にない。以前水産行政は農牧省漁業資源養殖総局が担当していたが、水産分野の開発促進のため専門の機関が必要と判断され、農牧省から独立した。組織図は別添のとおりである。理事会、総裁 (最も高い権威を持ち、理事会の総裁でもあり、大統領により直接任命される) の下に管理部、技術部、漁業組織部の三部が置かれている (組織図、別添)。管理部と技術部は Puntarenas にあり、漁業組織部は San Jose にある。他に技術部の下に地方事務所が El Coco、Quepos、Golfito、Limon の 4 ケ所と淡水養殖試験場が Ca as、Guapiles、San Carlos、Cerro de la Muerte の 4 ケ所に置かれている。職員数は約 120 人で、人員の 75% を技術部、15% を漁業組織部、10% を管理部が占めている。漁業許可、漁業調査、統計、養殖に係る業務は技術部が、漁民組織や普及事業に係る業務は漁業組織部が行っている。漁業組織部の市場課では、HACCP の適用に伴う品質検査と鮮度管理技術などの技術支援を行っている。

表 10. INCOPECSA における各部の役割

部名	所在地	構成員割合	作業内容
管理部	Puntarenas	10%	・管理
技術部	Puntarenas and others	75%	・漁業許可 ・統計 ・養殖 ・漁業調査

漁業組織部	San jose and Puntarenas	15%	<ul style="list-style-type: none"> ・漁民組織化 ・漁業企業振興 ・市場調査 ・品質管理 ・環境管理
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5.2.2.2. カウンターパートの配置

カウンターパート候補者として名前があがっている者は下記のとおりである。

表 11. カウンターパート候補者 (INCOPECA)

分野	カウンターパート候補者
漁業施策	Lic. Antonio Porras Porras
品質管理分野	Dr. Rolando Ramirez Villalobos (市場調査及び品質管理) Ing. Giselle Blanco Venegas (品質管理) Lic. Cecilia Soto Monge (品質管理)
資源管理分野	Lic. Hubert Araya Umana (資源管理) Prof. Aran Chacon (統計) Lic. Berny Marin (環境管理)

5.2.2.3. 予算

INCOPECA の予算は毎年ほぼ決まっています、その額は 7 億 5 千万コロンである。これには管理費に加え事業費も含まれている。人件費が上昇しているのもその分事業費が圧迫されている。例えば漁業統計はかつて毎月公刊されていたが、事業費の減額に伴い昨年は年二回、本年は年一回になる。INCOPECA が本プロジェクトのために考えている予算は次表のとおりである。

表 12. INCOPECA の本プロジェクトに対する 5 年間の予算概算 (単位：ドル)

予算科目	1 年	2 年	3 年	4 年	5 年
1. 人件費 (フルタイム 2 名及びパートタイム 6 名分)	67,200	67,200	67,200	67,200	67,200
2. 基本サービス費 (光熱費、通信運搬費、安全対策費)	450	450	450	450	450
3. 域内旅費	8,000	8,000	8,000	8,000	8,000
4. 船・車輛維持管理費	14,500	14,500	14,500	14,500	14,500
5. 消耗品費	100	100	100	100	100
6. 船賃借料					
7. 施設 (事務所及び試験所) 維持費	20,000	20,000	20,000	20,000	20,000
8. 資機材購入費					
小計	110,250	110,250	110,250	110,250	110,250
合計	551,250				

5.3. 他の機関との協力体制

5.3.1. ニコヤ湾保全委員会との協同

種々の公共・民間団体によって行われてきたニコヤ湾の管理と開発に関する活動を整理統合し、実効性のある計画を進めようという趣旨のもとにニコヤ湾開発保全委員会 (Comision para el desarrollo y Conservacion del Golfo de Nicoya, CDCGN) が 2000 年 1 月に設置され、2000 年 4 月から活動が開始された。この委員会には表 12 のように 17 個に及ぶ関係機関や組織が参加している。ニコヤ湾開発保全委員会は、本プロジェクトの合同調整委員会及び運営委員会の一員として本プロジェクトに参加することになっているので、これらの参加機関は当然本プロジェクトを支援し、協力することになる。

表 13. ニコヤ湾開発保全委員会の参加機関

機関組織の種類	機関組織の名称
学術団体	UNA ナショナル大学、UCR コスタリカ大学
政府機関	大統領府、MIDEPLAN、農牧省、MINAE、厚生省 INCOPECA、社会援助庁 (IMAS)、観光庁 (ICT)
地方自治体	Puntarenas 市、Guanacaste 自治体連合
民間組織	Costa de Pajaros 漁業協会、Puntarenas 観光協会、 ニコヤ湾環境保全協会、Barrio el Carmen 地区開発協会、 ASOTEMPISQUE

当委員会の基本的な目標は以下に要約するとおりで、ニコヤ湾の開発と環境保全に向けて官民の相違を調整し合意を得たうえで関連計画を実施することにある。

- 政府、村落共同体、生産者、環境保全団体、地方自治体など、参加機関及び関係セクターの所有する資源と意見を調整する。
- 参加機関の持つ計画を統合し、地域の最終的な目標を策定する。参加機関の場合は、個々の計画各々の意思決定を経る必要がある。
- 事業計画を実施するための受諾と評価には、代表的機関の分析、勧告が必要である。
- 事業計画の策定、実施のために、参加機関及び関係セクターの共同戦略の成立を促進する。
- 以上のような調整の役割に加え、ニコヤ湾で発生する将来及び現下の問題に関する研究、分析、解決方法の検討に参画する。
- 事業計画の策定実施に対して援助を行う外国政府、援助機関と交渉する。

5.3.2. 日本国内支援体制

プロジェクト国内支援委員会の設置を予定している。主な業務としては、研修カリキュラムの検討、購送資機材に関する助言、教材の作成支援、プロジェクト運営に関する助言、指導を日本人専門家に対して行う予定である。

5.4. プロジェクト終了後の自立的発展性

ニコヤ湾という半閉鎖的な海域で漁業を営んできた零細漁業者は、湾内の資源が確実に減少してきていることに危機感を持っていて、官民をあげて資源管理を行う必要があると肌で感じている。その資源管理対策の中心となるのが、行政機関である INCOPECA であり、実効性のある研究を求められている UNA である。UNA や INCOPECA のカウンターパート候補のこれまでの経験から判断して、本プロジェクトで移転された技術は確実にこうした機関に定着し、プロジェクトを通して日本から技術移転を受けることにより、独自に技術開発を進めることが可能であると考えられる。

5.5. 特別な配慮

本プロジェクトは、持続的な漁業システムの構築を目標として資源管理及び品質管理を取り上げたプロジェクトとなっているが、環境汚染も資源減少の大きな要因のひとつと考えられることから、生活排水の垂れ流しやゴミの海洋投棄が海をいかに汚染するのかという漁民教育も重要である。また、品質管理に関係すると思われるが、水産物の料理の仕方等漁村単位で魚食普及に関する啓蒙活動を行うことも大事になってくるものと考えられる。こういった活動はプロジェクトでは対応できないので NGO を巻き込んだ何らかの方策を考える必要があると思われる。

6. プロジェクトの基本計画

6.1. スーパーゴール

プロジェクトのスーパーゴールは次のように設定された。

零細漁民の家計収入が向上する

本プロジェクトは零細漁業者の生活向上を中心に検討したアプローチである。プロジェクト目標である「持続的な漁業システムの構築」の後、数年を経て上位目標である「持続的な漁業が行われる」ようになり、さらにその状態が継続することにより、零細漁業者の家計収入が向上することになる。

6.2. 上位目標

プロジェクトの上位目標は次のように設定された。

持続的な漁業が行われる

持続的な漁業とは、①漁業許可数の制限、②漁業許可期間の限定、③漁具・漁法の規制等を行政機関である INCOPESCA が適切かつ厳密に管理し、漁業者の多くが違反せずに規制を受け入れている状態を指す。プロジェクト目標である「持続的な漁業システムの構築」の後に数年を経て、漁業規制や資源意識啓発などの活動が積極的に行われている状態と考えられる。

6.3. プロジェクト目標

プロジェクト目標は次のように設定された。

持続的な漁業システムが構築される

持続的な漁業を目指して各機関がそれぞれの責務に応じて活動するためには、漁業システムが構築される必要がある。品質管理に関する成果は、漁業管理計画において漁獲量減少のインパクトへの対策であり、持続的な漁業システムの構築に寄与するものと考えた。

6.4. 成果

プロジェクト目標である「持続的な漁業システムが構築される」ために 6 つの手段が成果として選択・設定された。(1)~(3)は水産資源管理計画について、計画策定だけでなく、その実施、更新をプロジェクトで進めることが重要であり、策定、実施、更新が一巡するのに約 5 年は必要と考えられるため、3 区分した。

また、(4)~(6)は品質管理について、漁業者レベルでの技術開発及び技術普及、流通段階における品質管理向上の成果を選択・設定した。限られた期間の中で得られる成果には限界があり、5 年間に於いて、品質管理技術及び概念を伝達するシステムが整うことを目標としている。

(1) 水産資源管理計画が適切に策定される

漁業の実態調査、魚種の資源評価を通じて得た基礎データをもとに、ニコヤ湾開発保全委

員会と連携し、関係機関で協議した結果、計画が策定される。

(2) 水産資源管理計画が適切に実施される

漁業者に資源管理概念を周知することまでが、本プロジェクトで直接関わることと考えられる。周知後、その概念が漁業者に定着し、彼らが法規制を厳守しようとするのにはさらに長期間が必要である。

上位目標達成に向けて、プロジェクト終了後、計画を担保とした監督の実施を INCOPESCA が担当し、さらに警察庁が取り締まりを的確に行う必要がある。

(3) 水産資源管理計画が定期的に更新される

水産資源管理計画が実施された後に、漁獲活動及び漁業資源をモニタリングし、計画実施状況を調査し、関係機関で計画改訂を討議することにより、計画が更新される。なお、モニタリングはプロジェクト終了後も適時行い、計画更新を続けていく必要がある。

(4) 貝類の安全性向上のための方策が検討される

ニコヤ湾の汚染や貝毒蓄積の現況調査及び解決策の提言により、貝類の安全性向上の方策が整うことになる。

(5) 漁獲物の鮮度向上のための方策が普及される

漁獲物の鮮度の現況調査、漁法改善検討等により鮮度向上の方策を検討する。さらに零細漁業者に品質管理概念を周知し、改善状況を調査する。また、漁村において品質管理指導を行うことにより、品質管理技術及び概念が普及される。特に 2~3 割の漁獲物が品質悪化等により廃棄されており、この有効利用を検討する。品質管理アプローチにおいては、本成果に関する活動をプロジェクトの中心領域と考えられる。

(6) 流通段階における水産物の鮮度向上の方策が普及される

本プロジェクトは流通産業のための品質管理向上を目指すことを主目標とはしていないが、流通業者がより高品質な漁獲物を求め、零細漁業者から品質の高い漁獲物をより高値で購入するよう誘導することを意図している。

6.5. 活動

前述した成果(1)~(6)を達成するため、下記の活動を実施することが選択・設定された。各活動の番号は成果の番号に対応している。

なお、論点となったのは、資源管理概念や品質管理について漁業者に完全に浸透させることを UNA が当初求めたが、プロジェクト期間を5年間とした場合、限界があり、その浸透はプロジェクト終了後、INA（国立職業訓練学校）等と協力し時間をかけて推進することが了承された。

1-1 活動計画を策定する

1-2 漁業の実態を把握する

1-2-1 水揚げ状況を調査する（サイズ、魚種、季節変動）

1-2-2 漁具漁法を調査する

1-2-3 漁具選択性及び環境影響を検討する

1-2-4 新たな漁法を評価する

1-2-5 漁村構造を調査する

漁業の実態として、水揚げ状況、漁具漁法等の各調査を行い、続いて、漁具選択制及び環境影響の検討を行う。なお、新たな漁法の評価は新たに持ち込もうとする漁法について、その影響を事前に評価するシステムづくりを目指す。また、漁村構造調査では、漁業者の生活状況、資源管理概念に対する意識、漁業許可の制限に伴う影響予測、就業時間、収入、教育レベル等を探る。

1-3 漁獲魚種及び開発可能な魚種の資源評価を行う

1-3-1 水揚げ統計を整備する

1-3-2 利用種及び開発可能な魚種の生態調査を行う

1-3-3 再生産形態による検討を行う

1-3-4 資源評価データベースを構築する

1-3-5 利用種及び開発可能な魚種の資源評価を行う

漁業の実態調査結果に基づいて、これらの活動が行われる。

1-4 資源管理計画を策定する

1-5 関係機関で計画について協議する

1-5-1 計画を確認する

1-5-2 ニコヤ湾保全委員会と連携する

資源評価後、関係機関で計画を確認する。ニコヤ湾保全委員会と連携し、協議して、より効果的な計画を作成する。

2-1 漁業者に資源管理概念を周知する

2-1-1 教材を作成する

2-1-2 漁業者組織を啓発する

2-1-3 漁業者対象のワークショップを行う

資源管理概念が漁業者に周知されると、計画はより実効性のあるものとなる。周知は、教材作成、漁業者組織啓発、漁業者へのワークショップで構成される。ワークショップではモニタリングのため、セミナー開始直前、直後に意識に関する簡易アンケートを行うことが望ましい。漁業者組織の啓発活動については、一方的な教育ではなく、資源管理情報を交換し、相互の啓発活動とするべきである。

なお、漁業者に対する教材及びワークショップは漁業者の識字率等を考慮して作成する必要がある。

2-2 零細漁業者組織を管理する

2-2-1 不法漁業活動を監視する

2-2-2 漁業者支援体制を計画・提言する

漁業者に資源管理が周知されその概念が理解されても、違反操業をする漁業者がなくなるとは考えられないため、漁業活動を監視する必要がある。同時に、零細漁業者のためにいろいろな支援をするための体制を計画し、漁業者組織に提言を行うことがたいせつである。

3-1 漁獲活動をモニタリングする

計画の実施に伴う漁獲活動の変化を毎年モニタリングする。

3-2 資源をモニタリングする

漁獲活動の変化と併せて資源状況を定期的にモニタリングする。

3-3 計画実施状況を調査する

漁業者への資源管理概念の普及状況、関連機関の動きを中間評価等として調査する。

3-4 関係機関で計画改訂を討議する

モニタリング及び中間評価結果をもとに、関係機関で計画改訂を討議し、計画を更新する。なお計画作成後2～3年に1度の頻度で計画が更新されることが望ましい。

4-1 貝類の汚染や貝毒蓄積の現状を把握する

4-1-1 過去のデータを整理する

4-1-2 貝類の汚染物質の分析を行う

4-1-3 赤潮による貝毒の分析を行う

関連分野の過去のデータを整理し、魚介類の汚染物質や赤潮による貝毒について分析することにより、貝類の汚染や貝毒蓄積の現状を把握する。

4-2 解決策を提言する

4-2-1 汚染物質、貝毒蓄積をモニタリングする

4-2-2 モニタリング結果及び対応策を関係機関へ伝達する

汚染や貝毒蓄積の現状に基づいて、汚染物質や貝毒蓄積状況をモニタリングし、結果や対応策を提言として関係機関へ伝達する。

5-1 漁獲物の鮮度向上のために方策を検討する

5-1-1 漁獲物の鮮度の現状を把握する

5-1-2 品質の規格化を検討する

5-1-3 船上等での漁獲物の取り扱い方法を検討する

5-1-4 漁法の改善を検討する

はじめに漁獲物の鮮度の現状を調査し、問題点を明らかにする。続いて漁業者または漁村ごとの品質管理状況から、品質の規格化を検討する。さらに船上等において零細漁業者が実施可能な漁獲物の取り扱い方法を検討する。また、鮮度を良質に保つための漁法についても検討する。

5-2 漁業者に水産物の鮮度向上のために新技術を移転する

5-2-1 教材を作成する

5-2-2 漁業組織へ新しい取り扱い方法を受け入れるように啓発活動を行う

5-2-3 漁業者を対象としたワークショップを行う

漁獲物の鮮度向上検討結果を品質管理概念として漁業者に周知するため、教材作成、漁業組織への啓発活動、漁業者を対象としたワークショップを行う。ワークショップは可能であれば、資源管理概念の普及活動と併せて行うことが望ましい。なお、漁業者に対する教材及びワークショップは識字率等を考慮して作成する必要がある。

5-3 水産物の品質管理の改善状況を調べる

5-3-1 新技術と実施過程を評価する

5-3-2 厚生省に品質管理に関する国家政策を策定するように推奨する

品質管理概念が漁業者に受け入れられているか、定期的なモニタリングを行う。

5-4 漁村において品質管理指導を行う

5-4-1 ニコヤ湾開発保全委員会を通して関係機関を訓練計画に参画させる

品質管理の改善状況結果をもとに、漁村において指導を行う。この指導は、ニコヤ湾開発保全委員会の調整により国立職業訓練学校や他の機関の協力を得ながら、数か村においてモデル的に実施される。

なお、全村における継続的な普及活動は INA を通じて実施することが望ましい。

6-1 流通段階の鮮度向上方策を検討する

6-1-1 流通段階の鮮度の現状を調査・評価する

6-1-2 取り扱い方法を改善する

6-1-3 取り扱い方法の改善を評価する

流通段階の鮮度の現状を調査し、取り扱い方法の改善を検討する。

6-2 流通業者への研修を行う

6-2-1 流通業者対象のワークショップを実施する

6-2-2 教材を作成する

流通業者対象のワークショップを行い、改善策を提案する。なお、教材作成についてはその必要性や内容を検討する。教材作成はその後関係機関によって行われる。

6.6. 投入

投入として以下の通り方針が定められた。

【日本】

チーフ・アドバイザー兼水産施策
調整員
資源管理専門家
品質管理専門家
短期専門家
機材供与
研修員受け入れ

【コスタ・リカ】

ナショナル大学, INCOPECA より各専門家に対するカウンターパート（常勤）の配置
プロジェクトに必要な土地、事務所、研究施設の提供
Puntarenas
(Punta Morales)
(San Jos)
各種設備、車両、道具等の機材の設置
運営経費

6.7. 外部条件と外部要因リスクの分析

プロジェクトによりコントロールできず、条件が満たされるか不明な項目でプロジェクトの成果、目標等の達成に大きな影響のある外部条件について協議し、以下のことが確認された。

6.7.1. 活動の外部条件

法律が更新される

現在、漁業法の改正が国会で議論されており、水産資源管理計画を策定するためには、法律が適切に改正される必要がある。法改正は今後1年以内に予定されている。

6.7.2. 成果の外部条件

特になし

プロジェクト目標がシステム構築であるため、予定通り投入及び活動が実施され、成果を得ることにより、プロジェクト目標は達成される。

6.7.3. プロジェクト目標の外部条件

プロジェクト目標である持続的漁業システムが構築された場合、次の条件を満たせば、上位目標が達成される。

ニコヤ湾の環境汚染が現状より悪化しない

深刻な環境汚染が発生した場合、漁業活動そのものが行えなくなる。本プロジェクトでは魚介類の汚染物質の分析を行うが、環境汚染対策は含めていない。

自然現象により環境が悪化しない

気象条件による環境が大きく悪化する場合、漁業活動の実施が困難になる。一方、この対策は困難である。

安い水産物が大量に輸入されない

近隣諸国から極端に安価な水産物が輸入され、効果的な対策が取られない場合、漁業活動は衰退する。魚介類の価格が下がると、品質管理の効果がなくなり、普及が困難になる。

6.7.4. 上位目標の外部条件

上位目標である持続的な漁業が達成され、さらに次の条件が満たされることにより、スーパーゴールが達成される。

雇用が創出される

目的分析において「零細漁業者の家計収入が向上する」ためには漁業以外の代替手段が必要なことが確認された。特に、漁業を規制することにより、従前の漁業者数を低減させる必要が生じた場合、新たな収入手段が必要である。収入手段としては養殖、水産加工、観光等が考えられる。

水産物が商業化し、普及する

水産物の国内消費が増加し、水産加工物も普及することにより、漁村において流通業者が漁業者から買い取る魚価が上昇し、1人当たり漁業者の売上がさらに増加することになる。

6.7.5. スーパーゴールの外部条件

本プロジェクト終了後も、下記の条件が満たされることにより、零細漁業者の生活向上が継続する。

国家政策が継続される

本プロジェクト終了後、政権が変わっても零細漁業者のための持続的な漁業を推進する政策が継続される必要がある。

経済の安定

極端に国家経済が悪化した場合、零細漁業者を含め、コスタリカ国民の生活は向上しない。

6.8. プロジェクトの運営体制

プロジェクトの実施体制にかかる関係機関の現状と役割については、第 5 章に述べたとおりである。

6.8.1. プロジェクト管理の責任者

管理に関する責任の所在は、以下のとおりである。

- ・ UNA 自然科学部学部長 MSc. Juana Maria Coto は、プロジェクト・ダイレクターとして、プロジェクト実施全体の責任を持つ。
- ・ 生物学科長 MSc. Jorge Arturo Rodriguez は、UNA 側のプロジェクト・マネージャーとして、プロジェクトの管理面と技術面の責任を持つ。
- ・ EBM コーディネーター Lic. Oscar Pacheco は、UNA 側のプロジェクト調整員として、プロジェクト実施管理における調整とプロジェクト・マネージャーのサポートを行う。
- ・ 技術局長 Lic. Antonio Porras Porras は、INCOPECA 側のプロジェクト・マネージャーとして、プロジェクトの管理面と技術面の責任を持つ。
- ・ 総裁アドバイザー Dr. Fernando Viquez Alfaro は、INCOPECA 側のプロジェクト調整員として、プロジェクト実施管理における調整とプロジェクト・マネージャーのサポートを行う。
- ・ 日本側チーフ・アドバイザーは、プロジェクトの実施に関連するあらゆる事柄に関して、プロジェクト・ダイレクターおよび両プロジェクト・マネージャーに必要な勧告および助言を行う。
- ・ 日本側調整員は、プロジェクト実施管理における調整とチーフ・アドバイザーのサポートを行う。
- ・ 日本側専門家は、プロジェクトの実施に関連する必要な技術指導と助言を行う。

6.8.2. プロジェクトの運営体制

本プロジェクトの円滑で効果的な運営のために、組織図（別添）に示すように、コスタリカ側・日本側双方のメンバーによる合同調整委員会、運営委員会が設置される。

各委員会の目的、機能、構成メンバーは以下のとおりである。

(1) 合同調整委員会

プロジェクトの技術協力が効果的かつ成功裏に実施されるよう、合同調整委員会を設置する。

委員会の構成

委員会は、プロジェクト・ダイレクターを議長とし、プロジェクト・マネージャーおよび日本側専門家チームのチーフ・アドバイザーを副議長とする。構成メンバーは表 14 に示すとおりである。

委員会の機能

委員会は、少なくとも年一回、その必要に応じて開かれ、その機能は以下のとおりである。

- ・ R/D にそってプロジェクトで設定された年間運営計画を承認する
- ・ 技術協力プログラムの全体的な進捗、特に上記年間運営計画のもとに実施された活動をレビューする

- ・ 技術協力プログラムおよびその関連事項から発生する主要な問題点に関してレビューし意見交換する

表 14. 合同調整委員会のメンバー

構 成	委 員
議長	UNA 自然科学部学部長 MSc. Juana Maria Coto
副議長	UNA 生物学科長 MSc. Jorge Arturo Rodriguez INCOPECA 技術局長 Lic. Antonio Porras Porras 日本側専門家チームのチーフ・アドバイザー
コスタリカ側委員	1 UNA 学長 Dr. Sonia Marta Mora
	2 INCOPECA 総裁 Prof. Ligia Castro Ulate
	3 コーディネーター： Lic. Oscar Pacheco, EBM Dr. Fernando Viquez, INCOPECA
	4 UNA 側のカウンターパート： チーフ Lic. Cristian Fonseca (品質管理) Lic. Emilia Calvo Vargas (赤潮及び貝毒) Lic. Hernan Vargas Barrantes (微生物) 化学分析教官一名 チーフ Lic. Jose A. Palacios (漁業評価) Lic. Rosa Soto Rojas (漁業生物) Lic. Alberto Villarreal (漁法) MSc. Rigoberto Viquez (漁業) MSc. Luis Villalobos (魚網) MBA. Angel Herrera (資源管理：海外留学中) MSc. Farid Tabash (漁業評価：海外留学中)
	5 INCOPECA 側のカウンターパート： Dr. Rolando Ramirez Villalobos (市場調査・品質管理) Ing. Giselle Blanco Venegas (品質管理) Lic. Cecilia Soto Monge (品質管理) Lic. Hubert Araya Uma' a (資源管理) Prof. Adan Chacon (統計) Lic. Berny Marin (環境管理)
	6 ニコヤ湾開発保全委員会調整官
	7 関連機関の代表者
日本側委員	1 JICA 専門家
	2 JICA コスタリカ駐在員事務所 所長
	3 日本大使館 代表
	4 必要に応じて、JICA から派遣される関係者

(2) 運営委員会

運営委員会は、日本側とコスタリカ側双方より構成され、プロジェクトの活動の円滑な実施を図るために、1ヶ月に1回ないし必要に応じて開催される。

構成

運営委員会は、プロジェクト・マネージャーを議長、プロジェクト・マネージャー及び日

本側専門家チームを副議長とし、表 15 に示すような委員により構成される。

委員会の機能

機能は以下のとおりである。

- ・ 月間作業計画およびプロジェクト年間作業計画に沿った活動内容を承認する
- ・ 技術協力プログラムの進捗、特に上記年間運営計画のもとに実施された活動をレビューする
- ・ 目的達成状況を評価する

表 15. 運営委員会の構成

構 成	メンバー
議長	UNA 自然科学部学部長 MSc. Juana Maria Coto
副議長	INCOPECSA 技術局長 Ing. Antonio Porras Porras, UNA 生物学科長 MSc. Jorge Arturo Rodriguez
コスタリカ側委員 1	UNA コーディネーター
2	INCOPECSA コーディネーター
3	UNA 側のカウンターパート
4	INCOPECSA 側のカウンターパート
5	ニコヤ湾開発保全委員会調整官
日本側委員 1	JICA 専門家

6.9. 事前の義務および必要条件

プロジェクト実施前に確認が必要な前提条件を確認した。

プロジェクトに各機関が協力する

持続的な漁業システムは各機関が協力することで構築可能となる。現在、ニコヤ湾の漁業問題等に関する統制機関として、ニコヤ湾開発保全委員会があり、各関連機関が参加している。本プロジェクトの合同調整委員会及び運営委員会のメンバーにニコヤ湾開発保全委員会が加わっていることから、各機関が協力関係になる可能性は高いが、事前に協力を要請しておく必要がある。

7. プロジェクトの必要性・妥当性

7.1. プロジェクトの公益性と公平性

コスタリカは中米諸国の中では国民所得が高く（一人当たり GDP：3943.2 ドル、2000 年）、最も雇用率の高い国の一つといわれてきたが、1997 年には失業率が 5.7% と近年では雇用状況にかげりが出てきている。特に主要輸出農産物であるコーヒーやバナナの国際価格下落による農業への影響が大きく、これらのプランテーションで働いていた農民が手っ取り早く現金収入の得られる漁業をするためにニコヤ湾へ入ってくるようになった。そのほとんどが無許可漁業者である。その結果、ニコヤ湾では漁業者が増えすぎたために過剰漁獲となり漁獲量が減少している。それに伴い刺網の網目制限や延縄の針数制限を守らないいわゆる違反操業をする者が出てきており、深刻な社会問題となっている。このためコスタリカ政府は漁業法を改正し、取締りを厳しくしようとしているが、法の改正だけでは根本的な問題の解決にはならないだろうと考えられている。

ニコヤ湾の漁業管理の中心となる行政機関 INCOPECSA と実効性のある研究を求められている UNA には技術的な問題がある。各機関がそれぞれ独自の研究あるいは計画を実施し

てはいるが、これまでニコヤ湾が抱える問題を全体的にアプローチするということがなかった。そこで、政府はニコヤ湾の管理と開発に関する官・民の活動を整理統合し、実効性のある計画を進める必要があるとし、2000年1月に政府機関、学術機関、地方自治体及び民間団体を委員としたニコヤ湾開発保全委員会を INCOPECSA 内に設置した。

こういった状況下にあるので、いま日本の経験に基づいた技術を導入し、漁業資源の管理と漁獲した水産物の品質管理をテーマとしたプロジェクトを行い、ニコヤ湾開発保全委員会と協力してニコヤ湾の漁業管理に取り組むことは時宜を得ていると考えられる。

また、本プロジェクトの成果は、INCOPECSA や UNA をとおしてニコヤ湾の零細漁業者のみならず全国の零細漁業者へ波及する。品質管理面だけから考えても全国の水産物流通業者や加工業者へ影響を与え、その結果として消費者が品質の良い魚介類を入手できるようになると考えると、本プロジェクトは公益性と公平性を十分併せ持ったプロジェクトであると言える。

7.2. 技術的的確性

本プロジェクトは、ニコヤ湾の水産資源管理計画の作成・実施および漁獲物の品質向上のための方策の実施により、持続的な漁業システムを構築することを目標としている。本プロジェクトを実施するにあたり関連機関や漁業者と連携したり、或いは本プロジェクトにより漁獲統計、資源評価、鮮度管理等において開発される技術は、ニコヤ湾だけではなく全国の零細漁業に適用されることが期待できるばかりではなく、発展途上国といわれる全ての沿岸国にも応用されることが期待できる。

7.3. 当該分野における我が国の技術的優位性

海に囲まれた日本は、かつては漁獲量世界一を誇った水産国である。中国に首位の座を奪われて久しいとは言え、いまだに水産国日本であることには変わりがない。資源管理や品質管理の研究は多くの学術機関、水産研究機関、民間会社等によって行われてきており、その歴史は長く、技術は世界のトップレベルにある。また、日本では水産庁を筆頭に漁業調整委員会、漁業者連合、漁業協同組合等のシステムが発達しており、全国津々浦々に漁業者組織があり、そういった組織が上記の研究機関と連携して各地域の資源管理を行っている。したがって、本プロジェクトは我が国にとって最も得意とする分野の技術協力である。

7.4. 予想されるインパクトの大きさ

7.4.1. 政策的インパクト

本プロジェクトは、漁業資源の管理と漁獲物の品質管理によって、ニコヤ湾に持続的な漁業システムを構築することを目標としており、農牧業開発計画（1998～2002年）に含まれる水産分野の開発と持続的生産という政府の方針（事業計画）に技術的なサポートを提供することができるとともに、当事業計画を補完することも期待され、その政策的インパクトは大きいと言える。

7.4.2. 制度的インパクト

資源管理では漁獲活動や資源のモニタリング、品質管理では汚染物質や貝毒蓄積のモニタリングがあるが、これらのモニタリングはきちんとしたシステムを構築して定期的に行われていなければならないが、これまでそのようなシステムは構築されていない。本プロジェクトによりきちんとしたシステムが構築され、定期的なモニタリングが実施される。こ

のシステムが、ニコヤ湾だけではなくコスタリカ全域に普及するように厚生省、農牧省及び INCOPECSA によって取られた場合、本プロジェクトの制度的なインパクトは非常に大きいと言える。

7.4.3. 社会的インパクト

7.4.3.1. 裨益集団の特徴

本プロジェクトの直接の裨益者は UNA 及び INCOPECSA をはじめとする関連機関の資源管理及び品質管理の研究者や行政担当者である。また、本プロジェクトは持続的な漁業システムの構築を目標としていることから、最終的な裨益者は表 15 のように零細漁民をはじめとして消費者に至るまで多岐にわたる。

表 16. 裨益集団の特徴

団体	裨益者	裨益の特徴
政府	INCOPECSA ニコヤ湾開発保全委員会 CENADA	資源管理及び品質管理能力が向上する、普及活動が向上する、研修技術が向上する 調整能力が強化される 品質管理能力が向上する
学術機関	UNA ニコヤ湾開発保全委員会 INA	資源管理及び品質管理技術が構築される 資源管理及び品質管理技術が向上或いは普及する 研修能力が向上する
漁業	ニコヤ湾の零細漁業者 魚屋・魚市場 仲買業者 運輸業者 加工業者 輸出業者	資源管理・品質管理意識の向上、将来的には生活の向上 品質管理意識の向上
市民	湾内の住民 消費者	良品質の水産物入手

7.4.3.2. 裨益の内容

本プロジェクトのターゲットグループは約 3500 人いると言われているニコヤ湾の零細漁業者であるが、彼らのために持続的な漁業のための漁具漁法が検討され、漁獲物をより高価格で出荷するための対策がとられる。また、UNA や INCOPECSA の研究者には資源評価や品質に関する技術が導入される。行政担当者には、日本の進んだ管理技術が伝えられ、ニコヤ湾に適した管理技術が考案される。本プロジェクトでは、流通のアプローチは取られていないが、仲買業者、運輸業者、販売業者といった流通業者へ品質管理意識の向上という好影響を及ぼすものと考えられる。

7.4.4. 技術的インパクト

7.4.4.1. 技術移転対象者の数

コスタリカ側が示したカウンターパート候補者は UNA から 11 名、INCOPECSA から 4 名である。直接的にはこの 15 名が技術移転の対象者となるが、ニコヤ湾開発保全委員会が本プロジェクトで大きな役割を果たすことから、当委員会に所属する機関の者であれば誰でも技術移転の対象者に含めることができる。

7.4.4.2. 技術移転の内容

資源管理及び品質管理手法を習得し、ニコヤ湾における持続的漁業システムを構築するた

めに必要な技術移転を行う。技術移転の内容は、6.5.の活動で述べられている基本的な方向にそって、具体的なプログラムが作成される。プロジェクト終了後は、UNAとINCOPESCAは、習得した技術とプロジェクト期間中に作成された教材を用いて、ニコヤ湾で持続的な漁業が行われるように計画を継続・発展させなければならない。そして、これらの管理技術が各地に普及・定着していき、コスタリカ全体の漁業管理に貢献することが期待される。

7.4.5. 経済的インパクト

品質管理計画による零細漁民への経済的インパクトは、漁獲物の約 20%が品質が悪くて出荷されていないということを根拠に、零細漁民の収入が 20%上昇すると試算できる。本プロジェクト実施の結果、ニコヤ湾の零細漁業者及び漁業関係者が零細漁業者の収入向上のように将来何らかの利益を得るであろうことは確かである。その経済的インパクトは小さくはないであろうと考えられるが、そのインパクトを現段階で定量化することは困難である。現在のように漁業人口が増えて過剰漁獲が続くようでは持続的漁業システム自体が成り立たなくなるので、漁業人口の増加を抑え不法漁業を無くすための方策を検討することが急務である。このためには法改正により取締りの強化を行うだけでなく、海面養殖、水産加工、観光といった代替産業の創出が必要となってくる。本プロジェクトで構築された持続的漁業管理システムが機能し、そしてより大きな経済的インパクトが得られるように、本プロジェクトでこれらの代替産業についても検討することが期待されている。

7.5. プロジェクト実施妥当性の総合評価

コスタリカ側は本プロジェクトの重要性を十分に認識しており、プロジェクトの実施による成果に対して大きな期待を寄せている。かつて（1980年代）コスタリカの漁業生産の約 60%はニコヤ湾で漁獲されていたが、現在は 22%を占めるに過ぎないほど漁獲量が急減している。このような状況にあるニコヤ湾の開発・保全のために、これまで多くの研究が行われてきているが、今まで実効のある対策が打てないでいる。本プロジェクトが実施されることにより、今まで行われてきた数多くの研究が統合化され、新しい技術や手法が導入されることによって、はじめて持続的な漁業システムが構築されることになる。本プロジェクトの成果は、コスタリカ全域はもとより中南米の発展途上国における漁業管理システムづくりに良い見本となることが考えられ、その波及効果は甚大であると評価できる。

資料4 第1回短期調査ミニッツ

**THE MINUTES OF THE MEETING
BETWEEN THE JAPAN PREPARATORY STUDY TEAM
AND THE AUTHORITIES CONCERNED OF
THE REPUBLIC OF COSTA RICA
ON THE JAPANESE TECHNICAL COOPERATION PROJECT
FOR
THE SUSTAINABILITY OF THE FISHING ACTIVITIES AND
TECHNOLOGICAL TRANSFER TO DIVERSIFY THE PRODUCTION BY
MEANS OF MARICULTURE**

The Japanese Preparatory Study Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Hiromi Isa visited the Republic of Costa Rica for the purpose of identifying the outline of the Japanese Technical Cooperation Project (hereinafter referred to as "Project") in the Republic of Costa Rica.

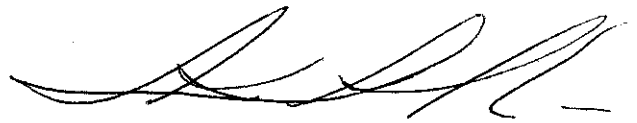
During its stay in the Republic of Costa Rica, the Team exchanged views and had a series of discussions with the Costa Rican authorities concerned, in respect of the desirable measures to be taken by both Governments for the successful implementation of the Project.

As a result of the discussion, both parties agreed to recommend to their respective Governments the matter referred to in the documents attached hereto.

San Jose, February 28, 2001

伊作 広己

Hiromi Isa
Leader
Preparatory Study Team
Japan International Cooperation Agency
Japan



Sonia Marta Mora E.
Rectora
Universiad Nacional
Costa Rica

THE ATTACHED DOCUMENT

1 COMMON UNDERSTANDING ON THE PROJECT

Both sides agreed that this project should enhance technology transfer and research activities of Marine Biology Station and will also contribute to improve artisanal fishermen and develop fishery industry in the Gulf of Nicoya through technology transfer and extension activities. In order to succeed in this project, both side agreed that coordination, cooperation, and involvement of INCOPESA and fishermen is necessary.

2 IMPLEMENTING ORGANIZATIONS AND PROJECT SITE

(1) Implementing Institute

National University of Costa Rica, The School of Biological Sciences

(2) Main Site of Technical Cooperation

National University of Costa Rica, The School of Biological Sciences, Marine Biology Station, Puntarenas

3 TERM OF THE TECHNICAL COOPERATION

Five (5) years

4 ACTIVITIES OF THE PROJECT

Costa Rican side requests to Japanese side following priority of activities. The team takes into consider requests and transmits requests to concerning agencies in Japan. Japanese side requests Costa Rican side to give clear descriptions of activities and objectives on HACCP, because original request dose not include HACCP. Activities will be elaborated in next preparatory study team and be determined by implementation study team. Furthermore, outputs of activities will be elaborated in next preparatory study team and be determined by implementation study team.

(1) HACCP

(2) Aquaculture

- Shrimp production in cages and disease



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- Snapper
- Oyster
- (3) Fishery resource management
 - Ecotrophic modeling
- (4) Monitoring problematic algae blooms

5 ASSIGNMENTS OF JAPANESE LONG TERM EXPERTS

Costa Rican side requests to Japanese side following priority fields of Japanese long-term experts. The team takes into consider requests and transmits requests to concerning agencies in Japan. Activities of Japanese long-term experts will be elaborated in next preparatory study team and number of Japanese long-term experts and fields will be determined by implementation study team. Assignment of long experts will be determined according to the detailed activities.

- (1) HACCP
- (2) Aquaculture
 - Snapper
 - Oyster
- (3) Monitoring problematic algae blooms
- (4) Fishery resource management
 - Ecotrophic modeling

6 MEASURES TO BE TAKEN BY JAPANESE SIDE

Assignments of Japanese Experts

Long-Term Experts

Short-Term Experts

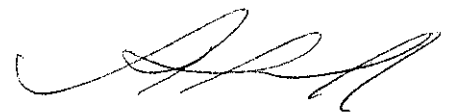
Provision of Equipment

Machinery, equipment and other materials necessary for the technical transfer by Japanese experts will be provided within the budget appropriation.

Acceptance of Costa Rican counterpart personnel for training in Japan

Approximately two (2) or three (3) counterpart persons annually.

SP
SL



7 MEASURES TO BE TAKEN BY COSTA RICAN SIDE

Within the framework of the Record of Discussion (R/D) agreement and in accordance with the laws and regulations in force in the Republic of Costa Rica, the UNA will take the following necessary measures at its own expense:

- (1) To assign full-time counterpart personnel for each Japanese expert;
- (2) To provide land, buildings and facilities for the implementation of the Project; and
- (3) To supply or replace machinery, equipment, instrument, vehicles, tools, spare parts, and any other materials necessary for the implementation of the Project other than those provided through JICA under article 7.

In accordance with the laws and regulations in force in the Republic of Costa Rica, the UNA will request the Government of Costa Rica to take the necessary measures to meet:

- (1) Expenses necessary for transportation within the Republic of Costa Rica of the articles referred to in article 7 as well as for the installation, operation and maintenance thereof;
- (2) Customs duties, internal taxes and any other charges, imposed in the Republic of Costa Rica on the articles referred to in article 7; and
- (3) All running expenses necessary for the implementation of the Project.

8 CLAIMS AGAINST JAPANESE EXPERTS

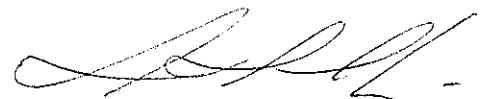
Within the framework of technical cooperation treaty between The Government of Japan and The Government of Costa Rica, The Government of Costa Rica undertakes to bear claims, if any arises, against the Japanese experts engaging in the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in Costa Rica, except for those arising from willful misconduct or negligence of the Japanese experts.

9 ESTABLISHMENT OF JOINT COMMITTEE

For the smooth implementation of the Project, a joint committee shall be established and meetings of the committee will be held at least once a year on a regular basis, and if the necessary arises. Japanese side requests Costa Rican side to invite members from INCOPECA and Ministry of Environment and Energy.

The function of the Committee is as follows:

- (1) Formulation of annual work plan for the Project,
- (2) Review of annual work plan of the Project,
- (3) Review and exchange of views on major issues of all problems arising from in connection with



the technical cooperation,

(4) Examination of local budget-draft necessary for the Project,

(5) Staffing of the Project, and

(6) Others

10 FUTURE PROCEDURES

(1) JICA will send a preparatory study team to the Republic of Costa Rica in order to prepare detail plan of the Project. This preparatory study team will prepare a project document, which mainly includes following items.

- Background of project

- Project justification

- Project activities, outputs

- Necessary experts and equipments

- Project schedule

- Project Design Matrix (Project overall goal, project goal, activities, input, project effect, project achievement, index to measure project achievement, project risk and etc.)

(2) The formulation of the Project will be completed by the signing of the Record of Discussion by the representative of the Republic of Costa Rica and the Leader of the Japanese Implementation Discussions Team.



資料5 第2回短期調査ミニッツ

**Minutes of Meetings Between The Japanese Preparatory Study Team
and The Authority Concerned of The Republic of Costa Rica**

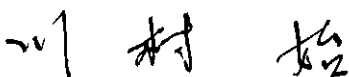
on

**The Japanese Technical Cooperation Project on Fisheries management for
sustainable fisheries.**

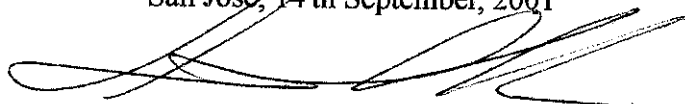
The Japanese Preparatory Study Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Hajime Kawamura, visited the Republic of Costa Rica from 2nd September to 14th September, 2001, for the purpose of working out the details of the technical cooperation programme concerning the Project for sustainable resources utilization of the Golfo de Nicoya.

During its stay in the Republic of Costa Rica, the Team, jointly with the representatives of Universidad Nacional, Costa Rica (hereinafter referred to as "UNA"), Instituto Costarricense de Pesca y Acuicultura (INCOPECA) and concerned agencies of Costa Rican Government, conducted field surveys and the workshop and had a series of meetings. As the result, the both parties agreed to suggest their respective governments to consider to prepare seriously the cooperation project described in the attached document hereafter.

San Jose, 14th September, 2001



Mr. Hajime Kawamura
Leader
Preparatory Study Team
Japan International Cooperation Agency
Japan



Dra. Sonia Marta Mora Escalante
Rectora
Universidad Nacional
Costa Rica



MSc. Herbert Nanne Echandi
Presidente Ejecutivo
INCOPECA
Costa Rica

1. Name of the Project

Both sides agreed to use "Fisheries management for sustainable fisheries" as the name of the Project. However, the name may be changed over course of future discussions before the signing of the Record of Discussions (hereinafter referred to as "R/D").

2. Project Area and Site

The Golfo de Nicoya and surrounding area will be the Project Area. National University of Costa Rica, the School of Biology Sciences, Marine Biology Station, Puntarenas will be the Project Site.

3. Duration of the Project

The duration of the technical cooperation for the Project will be five (5) years. However, the duration may be subjected to modification according to future discussions before signing on the R/D.

4. Implementing Agency of the Project

National University of Costa Rica (hereinafter referred to as "UNA") and Instituto Costarricense de Pesca y Acuicultura (hereinafter referred to as "INCOPESCA") will bear overall responsibility for the implementation of the Project.

5. Framework of the Project

Framework of the Project may be subjected to modification according to future discussions before signing on the R/D.

(1) Super Goal

The Super Goal of the Project will be "Economic income of fisherpersons' families improves."

(2) Overall Goal

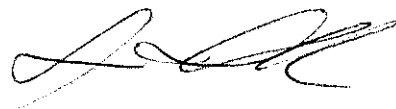
The overall goal of the Project will be "Sustainable fishing activities are practiced"

(3) Project Purpose

The Project purpose is to "Sustainable fishing system is developed"

HN

HN



1. Name of the Project

Both sides agreed to use "Fisheries management for sustainable fisheries" as the name of the Project. However, the name may be changed over course of future discussions before the signing of the Record of Discussions (hereinafter referred to as "R/D").

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5. Framework of the Project

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(1) Super Goal

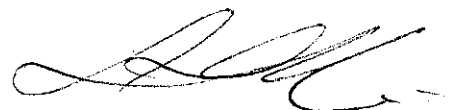
The Super Goal of the Project will be "Economic income of fisherpersons' families improves."

(2) Overall Goal

The overall goal of the Project will be "Sustainable fishing activities are practiced"

(3) Project Purpose

The Project purpose is to "Sustainable fishing system is developed"



managerial and technical issues of the Project.

(3) INCOPESCA will assign one person as the Project Manager who will be responsible for managerial and technical issues of the Project.

(4) Each Project Manager will appoint one Costa Rican counterpart as the Project Coordinator who will be in charge of supervising technical aspects as well as daily administrative matters pertaining to the implementation of the Project.

(5) For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and compositions are described in ANNEX1.

7. Measures to be taken by Costa Rican government

Within the provision of the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Costa Rica, signed in Tokyo on May 24th, 1985 (hereinafter referred to as the "Agreement") and in accordance with the laws and regulations in forces in the Republic of Costa Rica, UNA and INCOPESCA will take the following necessary measures at their own expense:

- (1) To assign full-time counterpart personnel for each Japanese expert;
- (2) To provide land, buildings and facilities for the implementation of the Project; and
- (3) To supply or replace machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided through JICA under article 7.

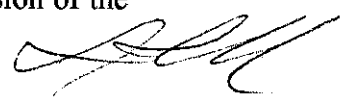
In accordance with the laws and regulations in forces in the Republic of Costa Rica, the UNA and INCOPESCA will request the Government of the Republic of Costa Rica to take the necessary measures to meet:

- (1) Expenses necessary for transportation within the Republic of Costa Rica of the articles referred to in article 7 as well as for the installation, operation and maintenance thereof;
- (2) Customs duties, internal taxes and any other charges, imposed in the Republic of Costa Rica on the articles referred to in article 7; and
- (3) All running expenses necessary for the implementation of the Project.

8. Measures to be taken by Japanese government

In accordance with the laws and regulations in force in Japan and the provision of the

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Agreement, the Government of Japan will take, at its own expense, the following measures through JICA:

(1) Dispatch of Japanese Experts

The government of Japan will provide the services of the Japanese experts.

(2) Provision of Machinery and Equipment

The Government of Japan will provide equipment, machinery and materials necessary for the implementation of the Project.

(3) Training of Costa Rican Personnel

The Government of Japan will receive Costa Rican personnel connected with the Project for technical training in Japan.

9. Claims Against Japanese Experts

In accordance with the Agreement, the Government of the Republic of Costa Rica undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Government of the Republic of Costa Rica except for those arising from the willful misconduct or gross negligence of the Japanese experts.

10. Result of the Workshop

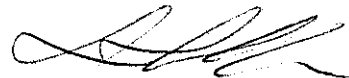
The Workshop was held from September 4, 2001 to September 7, 2001 with participation of UNA, INCOPESCA, central government officials and the others concerned.

(1) Results of Workshop

Project Cycle Management (PCM) was introduced to the participants, mentioned in ANNEX2. Stakeholders Analysis, Problem Analysis, Objective Analysis, Project Selection and PDM formulation were performed by the very active discussion of the variety of stakeholders. Through the workshop, the concept and process of Participatory Planning on PCM was shared by all the participants and the PDM draft was discussed and modified after the Workshop.

(2) Draft of Project Design Matrix

The results of PCM workshop are summarized in the PDM and compiled with other results of meetings, attached as ANNEX3.



11. Future Procedures

The schedule until the implementation of the Project is shown as follows:

(1) Around middle of November, 2001

Third Preparatory Study Team will be dispatched for further surveys and finalize the Project Document.

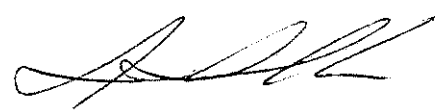
(2) Around January, 2002

Project Design Team will be dispatched in order to sign on the R/D for the commencement of the Project.

12. Others

Other matters not mentioned in this minutes shall be discussed through mutual consultations.

- ANNEX 1. Joint Coordinating Committee
- ANNEX 2 List of Participants in the PCM Workshops
- ANNEX 3. The Project Design Matrix



ANNEX 1. The Function and Provisional Composition of Joint Coordinating Committee

1 Function

The Joint Coordinating Committee will be held at least once a year and whenever necessity arises. Its functions are as follows:

- (1) Formulation of annual work plan for the Project;
- (2) Review of annual work plan of the Project;
- (3) Review and exchange views on major issues arising from or in connection with the technical cooperation;
- (4) Examination of local budget-draft necessary for the Project;
- (5) Staffing of the Project, and
- (6) Others

2 Provisional Composition

(1) Chair person

(2) Committee members

(Costa Rican Side)

- a. Project Director (UNA)
- b. Project Manager (UNA)
- c. Project Manager (INCOPESCA)
- d. C/P designated by the Project Director
- e. CDCGN (Comision para el Desarrollo y Conservacion del Golf de Nicoya)
- f. Other personnel concerned with the Project decided by the Costa Rican side, if necessary

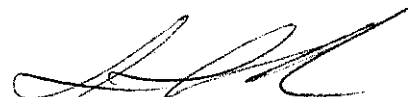
(Japanese Side)

- a. Chief Advisor
- b. Project Coordinator
- c. Japanese Experts designated by the Chief Advisor
- d. Representatives of the JICA Office in Costa Rica
- e. Other personnel concerned with the Project decided by JICA, if necessary

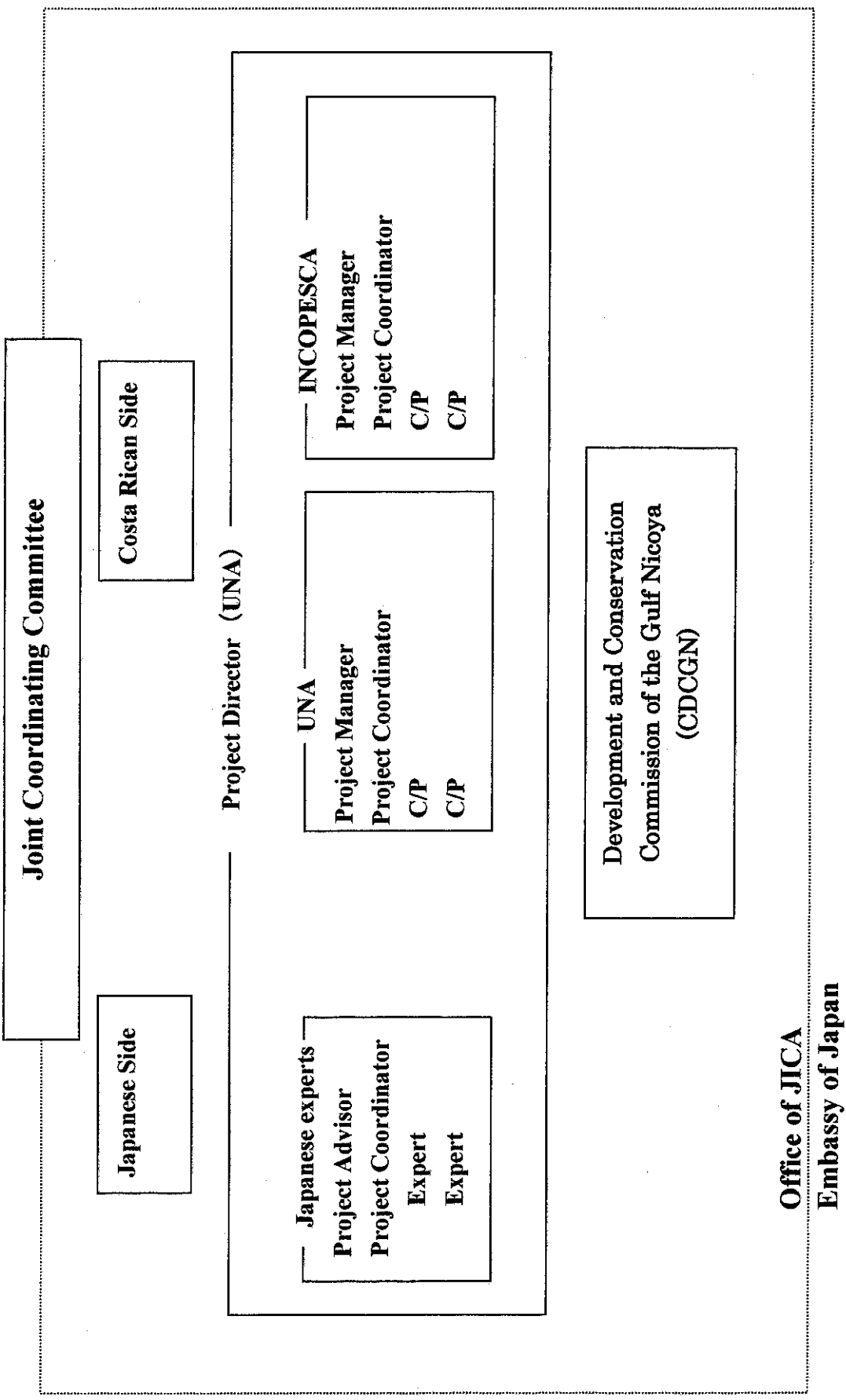
Note: Official(s) of Embassy of Japan in Costa Rica may attend the Committee as observers.

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ANNEX 2 Lists of participants in the PCM Workshops

No.	Name	Institution	Section
1	M.Sc. Jorge A. Rodríguez	UNA-Puntarenas	Director, ECM
2	Lic. Leonardo Borrás Porras	UNA-Puntarenas	Est. Biología Marina
3	Lic. José A. Palacios	UNA-Puntarenas	Es. Biología Marina
4	Lic. Gerardo Zúñiga Calero	UNA-Puntarenas	Es. Biología Marina
5	M.Sc. Jorge Boza Abarca	UNA-Puntarenas	Es. Biología Marina
6	Lic. Rosa Soto Rojas	UNA-Puntarenas	Es. Biología Marina
7	M.Sc. Roxana Viquez	UNA-Puntarenas	Es. Biología Marina
8	Lic. Emilia Calvo Vargas	UNA_Puntarenas	Es. Biología Marina
9	Lic. Rafael Angel Cruz	UNA-Puntarenas	Coordinador, EBM
10	Lic. Sidey Arias Valverde	UNA-Puntarenas	Es. Biología Marina
11	Dr. Luis Sierra Sierra	UNA-Heredia	Vicedecano, FCEN
12	M.Sc. Juana María Coto	UNA-Heredia	Decana, FCEN
13	Lic. Rolando Ramírez	Incopesca	Depto. Mercadeo
14	Lic. Ana Salas	Incopesca	Dept. Registro Pesca
15	Lic. Huberth Araya	Incopesca	Depto. Pesca
16	Lic. Adán Chacón	Incopesca	D. Estadística Pesq.
17	Bach. Alvaro Otárola	Incopesca	Cultivo
18	Dr. Juan Bautista Chavarría	UCR-CIMAR	
19	M.Sc. Alvin Rosales	INA-Puntarenas	D. Procesamiento
20	Lic. Guillermo Oro	INA-Puntarenas	Depto. Cultivo
21	M.Sc. Marcos Acosta N.	INA-Puntarenas	Direc. Cent. Náutico
22	M.Sc. Renato Sánchez	MINAE	ACOPAC
23	Lic. Rolando González	CENADA-PIMA	Comercialización
24	Lic. Iris Alfaro Sojo	IMAS	Directora Regional
25	Dr. Carlos Valverde	MAG	Jefe Regional .Salud Animal
26	Lic. Fredy Vasquez	MAG	
27	Lic. Rafael Piñar Ballesteró	CNP	
28	Lic. Oscar Pacheco Urpí	C.D.C.G.N.	
29	Ing. Javier Catón	Cámara de Pescadores	Gerente Ejecutivo
30	Lic. Jorge Barrantes	Cámara de Pesc. Artesanal	Vicepresidente
31	Lic. José A Peña Sánchez	Municipalidad	Presidente Municipal
32	Sr. José J. Elizondo	Cámara de Pesc. Artesanal	Fiscal General
33	Lic. Efraín Durán	Incopesca	Estación Experi-Mental Acuicola
34	Lic. Cristina Alvarado	UCR	Coordinadora
35	M.Sc. Mayela Valverde	Proyecto Savegre	Promoción Gestión, Local
36	Bach. Hilde Quirós	Proyecto Savegre	Socióloga
37	Lic. Olger Chaves Flores	Proyecto Savegre	Planificación
38	Técnico. Oscar Soto Pérez	CNP	Técnico Agrícola
39	Shinji Nishiyama	Embassy of Japan	Secound secretary
40	Hajime Kawamura	JICA Study team	Leader
41	Ichiro Mimura	JICA Study team	Planning Management
42	Hikaru Ishihara	JICA Study team	Quality Assurance
43	Masato Iizawa	JICA Study team	Project Impact Analysis
44	Takenori Tanaka	JICA Study team	Participation Planning

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ANNEX 3 The Project Design Matrix

Project's name: Fisheries management for sustainable fisheries.

Duration: 2002-2007

Place: Golfo de Nicoya and surroundings. Objective group: Small-scale fishing groups September 14, 2001

Narrative summary	Objectively Verifiable Indicators	Means of verification	Important Assumptions
Final goal Economic income of fisherpersons' families improves.	Their income is higher than minimum wage	Income investigation of fisherperson's families	Economical stability Continuity in the national policies
Overall Goal Sustainable fishing activities are practiced.	Reduction in fishing The volume of fishing increases in 20% for each fisherperson.	Fishing analysis	Openings for employees Progress with the commercialization and promotion of fishing products.
Project purpose Sustainable fishing system is developed.	Institutions work according to Activities' Plan Increment in the use of rejected fish because of bad quality.	Report about the project. INEC's statistics The study of fishing (activity)	Reduction of pollution in the Golfo de Nicoya. Natural phenomenon does not affect the volume of production and quality of the product. There is not importation of competitive fishing products at lower prices.

Outputs			
1. A general plan for fishery resources management is formulated.	Confirm plan results.	Plan's document	
2. The plan for the fishery resources management is executed.	Training of 22 fishing communities in the Golfo de Nicoya	Workshops record: Number of participants Survey results	
3. The plan for the fishery resources management is updated.	Verify if the activities plan was updated	Document of the activity plan result.	
4. The method to improve quality of sea products is evaluated.	Carry out the proposal	Document of the plan	
5. The method to improve freshness in the fisheries products is promoted.	Training of 22 fishing communities in the Golfo de Nicoya	Workshops record: Number of participants Survey results	
6. The method to improve freshness in the transport of products is promoted.	Training of 22 fishing communities in the Golfo of Nicoya	Workshops record: Number of participants Survey results	
7. Interest toward the quality of products is increased.	Predilection for high quality products increases each year, according to consumers' survey.	Integral program for agricultural merchandising. Annual report.	

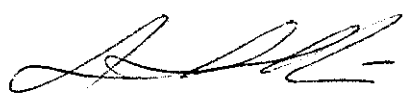
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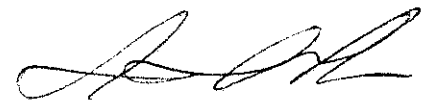
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Activities			
<p>1.1. Understand fisheries reality.</p> <p>1.1.1. Research about the reality of fish catch (sizes, species, season's variation).</p> <p>1.1.2. Research of methods and techniques for fishing.</p> <p>1.1.3. Analysis for the fishing gear selectivity and the environmental impact.</p> <p>1.1.4. Evaluation of new fishing methods.</p> <p>1.1.5. Socioeconomic analysis.</p> <p>1.2. Evaluation: (exploited species and exploitable species).</p> <p>1.2.1. Put in order fish landing statistics.</p> <p>1.2.2. Implement a research about exploited species and exploitable species of bioecological development.</p> <p>1.2.3. Understand their reproduction pattern.</p> <p>1.2.4. Create a database.</p> <p>1.3. Exchange of ideas among institutions and organizations.</p> <p>1.3.1. Plan's verified.</p> <p>1.3.2. Coordinate with the Committee of Development and Conservation of the Golfo de Nicoya.</p> <p>2.1 Teach the concepts of fishery resources management to fisherpersons.</p> <p>2.2.1. Promote fisheries associations.</p> <p>2.2.2. Carry out workshops for fisherpersons.</p>			
<p>3.1. Monitor fishing activities.</p> <p>3.2. Monitor fishery resources.</p> <p>3.3. Review plan's results.</p> <p>3.4. Exchange of ideas among institutions and organizations.</p>	Investment Japan	Costa Rica	Previous conditions *Institutions cooperate in the project
<p>4.1 Understand the reality of contamination and red tide toxin accumulation in mollusks.</p> <p>4.1.1. Put in order knowledge and data from previous research.</p> <p>4.1.2. Analyze contamination elements in shellfish.</p> <p>4.1.3. Analyze toxicity in mollusks.</p> <p>4.2. Recommend solutions.</p> <p>4.2.2. Monitor contamination and toxin accumulation in mollusks.</p> <p>4.2.3. Report to the institutions and organizations the results of monitoring and suggest control methods.</p>	<p>Long-term experts</p> <p>Leader /fisheries policy</p> <p>Coordinator</p> <p>Quality control</p> <p>Resources management</p> <p>Short-term experts</p>	<p>C/P UNA (Puntarenas) INCOPECA</p> <p>Place, office, center for research (Punta Morales) (Puntarenas) (San José)</p>	

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5.1. Evaluate methods to improve freshness of fishing products. 5.1.1. Understand current reality about freshness in products. 5.1.2. Analyze quality standards. 5.1.3. Evaluate treatment of products on board. 5.1.4. Think about fishing methods improvement.	Equipment donation CIP training	Operating budget assigned UNA INCOPECA	
5.2. Teach the concepts of assurance and quality control to fisherpersons. 5.2.1. Elaborate the text. 5.2.2. Promote fisheries associations. 5.2.3. Carry out workshops for fisherpersons.			
5.3. Investigate if increase the product freshness level.			
5.4. Technical advice about specific problems of quality control to fisheries communities.			
6.1. Evaluate the method to maintain freshness in commercialization step. 6.1.1. Investigate the freshness level in transporting. 6.1.2. Evaluate the improvement in the handling. 6.2. Trader training. 6.2.1. Workshop for trader. 6.2.2. Analyze manuals.			
7.1. Promotion for customers 7.2. Evaluate the impact of private enterprises about HACCP 7.2.1. Evaluate the viability of the quality standards. 7.2.2. Design a record system to assure quality. 7.2.3. Study the organoleptic inspection.			



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資料6 第3回短期調査ミニッツ

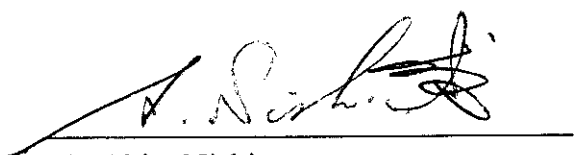
Minutes of Meetings
Between The Japanese Preparatory Study Team
And The Authority Concerned of The Republic of Costa Rica
on
The Japanese Technical Cooperation Project on
Sustainable Fisheries Management for The Gulf of Nicoya

The Japanese Preparatory Study Team (hereinafter referred to as “the Team”), organized by Japan International Cooperation Agency (hereinafter referred to as “JICA”), and headed by Mr. Akira Nishimoto, visited the Republic of Costa Rica from 11th November to 17th November, 2001, for the purpose of confirming the concrete plans of activities and examining the contents of the project document concerning the Project on Sustainable Fisheries Management for The Gulf of Nicoya.


During its stay in the Republic of Costa Rica, the Team had a series of discussions and exchanged views with the representatives of Universidad Nacional, Costa Rica (hereinafter referred to as “UNA”), Instituto Costarricense de Pesca y Acuicultura (INCOPECA), and concerned agencies of Costa Rican Government.

As the result, the both parties reached common understanding concerning the matters referred to in the attached documents hereafter.

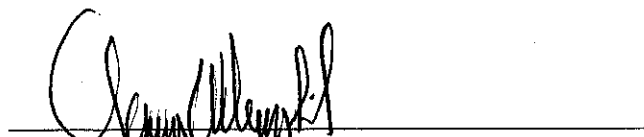
San Jose, 16 th November, 2001



Mr. Akira Nishimoto
Leader
Preparatory Study Team
Japan International Cooperation Agency
Japan



Dra. Sonia Marta Mora Escalante
Rectora
Universidad Nacional
Costa Rica



Mr. George Heigold
Presidente Ejecutivo a.i
Instituto Costarricense de Pesca y Acuicultura
Costa Rica

ATTACHED DOCUMENTS

1 Outline of the Project

(1) Name of the Project

Both sides agreed to decide "Sustainable Fisheries Management for The Gulf of Nicoya" as the name of the Project. However, the name may be modified according to future discussions before the signing of the Record of Discussions (hereinafter referred to as "R/D").

(2) Project Area and Site

The project area will be The Gulf of Nicoya and surrounding area.

The project site will be National University of Costa Rica, the School of Biology Sciences, Marine Biology Station (EBM) and INCOPECSA in Puntarenas.

(3) Duration

The duration of the technical cooperation for the Project was decided for five years. However, the duration may be subject to modification according to future discussions before signing on the R/D.

(4) Project Purpose

The Purpose of the Project is the construction of a sustainable fishery system.

2. Project Design Matrix (PDM) (ANNEX 1)

Both sides agreed to modify the PDM according to the discussions.

3. Role of Costa Rican Agencies Concerned

Based on the agreement between UNA and INCOPECSA (ANNEX 2), the both sides are responsible for the Project implementation according to the Plan of Operation.

4. Administration of the Project

(1) Project Director

Msc. Juana Maria Coto, Dean of College of Exacts and Natural Sciences, UNA

(2) Project Manager

Msc. Jorge Arturo Rodríguez, Director of the Biology School, UNA

Msc. Ricardo Gutiérrez Vargas, General Technical Director, INCOPECSA

(3) Project Coordinator

Coordinator of EBM, UNA

Lic. Antonio Porras Porras, Director of Fisheries and Aquaculture management,
INCOPECSA

(4) The Joint Coordinating Committee

Chairperson

Msc. Juana Maria Coto, Dean of College of Exacts and
Natural Sciences of UNA

Vice-chairpersons

Msc. Jorge Arturo Rodriguez, Director of the Biology School
of UNA
Msc. Ricardo Gutierrez Vargas, General Technical Director
of INCOPECSA
Chief advisor of Japan expert team

Costa Rica side member 1 Coordinator of Development and Conservation Commission
of The Gulf of Nicoya (CDCGN)

2 Counterparts of UNA

3 Counterparts of INCOPECSA

4 President of UNA

5 President of INCOPECSA

6 Representatives of Organizations concerned

Japan side member

1 JICA experts

2 Director of JICA Costa Rica office

3 Embassy of Japan (Observer)

4 Other personnel concerned to be dispatched by JICA, if
necessary

5. Plan of Operation

Both sides agreed to decide Plan of Operation of the management of fishery resources
(ANNEX 3) and Plan of Operation of the quality control of fisheries products (ANNEX 4).

6. Budget Allocation


The budget allocation of UNA and INCOPECSA for the Project is shown in ANNEX 5.

7. Project Implementation Structure

Both sides agreed to decide the Project Implementation Structure (ANNEX 6)

8. Future Procedures

The schedule until the implementation of the Project is shown as follows.


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(1) Signing of R/D

Both sides are ready to commence the project; the Project Design Team will be dispatched in order to finalize the conditions, scope and methodology of the Project with Costa Rican Authorities concerned. R/D will be signed and exchanged between the Japanese and Costa Rican side at that time.

(2) Dispatch of Long Term Experts

After the exchange of R/D, Japanese Long Term Experts will be selected by Japanese side. At the same time, Costa Rican side will be ready to accept the Japanese Long Term Experts.

9. Others

It is expected that the Project will be the model of sustainable fisheries management in the neighbor countries as well as the other areas in Costa Rica in the future.

END

- ANNEX 1 Project Design Matrix (PDM)
- ANNEX 2 The agreement between UNA and INCOPECA
- ANNEX 3 Plan of Operation of the management of fisheries resources
- ANNEX 4 Plan of Operation of the quality control of fisheries products
- ANNEX 5 The budget allocation of UNA and INCOPECA for the Project
- ANNEX 6 Project Implementation Structure
- ANNEX 7 Project Document (Draft) (省略)

The Project Design Matrix

Project's name: Sustainable Fisheries Management in the Gulf of Nicoya **Duration:** 2002-2007
Place: Gulf of Nicoya and surroundings. **Objective group:** Small-scale fishing groups

November 16, 2001

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Super Goal Household incomes of artisanal fishermen are improved	Their income is higher than minimum wage	Income investigation of fisherperson's families	Continuity in the national policy : Economical stability Creation of employment
Overall Goal Sustainable fisheries are performed	The fishing amounts of artisanal fishermen become stable	Fisheries statistics	Increase of fisheries products consumption and spread of fisheries processed products
Project Purpose Construction of a sustainable fishery system	The fishing amount of main species is repeatedly obtained within the planned amount The quality of products caught by artisanal fishermen is improved	Report of the Project Fisheries statistics Organoleptic test K value, etc.	No aggravation of the environmental pollution in the Gulf of Nicoya . No worsening of the environment by natural phenomenon Cheap fisheries products not imported in large quantities

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Outputs			
1. A fisheries resources management plan is drawn up appropriately.	The plan is accepted by artisanal fishermen The plan reflects the results of investigation	Document of plan	
2. The fisheries resources management plan is appropriately implemented.	Training of 22 fishing communities in the Gulf of Nicoya Periodical watching is conducted.	Workshops record: Number of participants Survey results Watching report	
3. The fisheries resources management plan is periodically updated	Verify if the activities plan was updated	Document of the activity plan result.	
4. A safety improvement policy of shellfishes is drawn up.	Carry out the proposal	Document of the plan	
5. A freshness improvement policy of fisheries products is spread.	Increment in the use of rejected fish because of bad quality. Training of 22 fishing communities in the Gulf of Nicoya	INEC's statistics The study of fishing (activity) Workshops record: Number of participants Survey results	
6. The freshness improvement policy of fisheries products in a circulation stage is spread.	Training of 22 fishing communities in the Gulf of Nicoya	Workshops record: Number of participants Survey results	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>1-1 Elaborate the plan of activities</p> <p>1-2 Understand the actual condition of fisheries</p> <p>1-2-1 Investigate landing situations (size, species, seasonal variation)</p> <p>1-2-2 Investigate fishing gears and methods</p> <p>1-2-3 Examine fishing gear selectivity and environmental impact</p> <p>1-2-4 Evaluate new fishing methods</p> <p>1-2-5 Investigate the structures of fishery communities</p> <p>1-3 Evaluate the resources of fishing species and exploitable species</p> <p>1-3-1 Fix landing statistics</p> <p>1-3-2 Conduct ecological investigation of species utilized and exploitable species</p> <p>1-3-3 Examine the biology and reproduction forms</p> <p>1-3-4 Build a database of resources evaluation</p> <p>1-3-5 Evaluate the resources of species utilized and exploitable species.</p> <p>1-4 Elaborate the plan of resources management</p> <p>1-5 Discuss on the plan in the organs concerned</p> <p>1-5-1 Check the plan</p> <p>1-5-2 Coordinate with other organizations concerned through the cooperation with CDCGN</p>			

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>2-1 Make it well-known to the fishermen the resources management concept</p> <p>2-1-1 Create educational materials</p> <p>2-1-2 Promote fishermen's organization</p> <p>2-1-3 Hold workshops for fishermen</p> <p>2-2 Manage the artisanal fishery organizations</p> <p>2-2-1 Watch the activities of the illegal fishery</p> <p>2-2-2 Design and suggest the supporting system for the fishermen.</p> <p>3-1 Monitor fishing activities</p> <p>3-2 Monitor fisheries resources</p> <p>3-3 Investigate the enforcement situation of the plan</p> <p>3-4 Discuss on the revision of the plan in the organs concerned</p> <p>4-1 Grasp the present condition of contamination and shellfish toxin accumulation</p> <p>4-1-1 Fix the data of the past</p> <p>4-1-2 Analyze the contaminants of shellfishes</p> <p>4-1-3 Analyze the shellfish toxins caused by red tide</p> <p>4-2 Propose solution</p> <p>4-2-1 Monitor contaminants and shellfish toxin accumulation</p> <p>4-2-2 Transmit the results of monitoring and the countermeasures to the organs concerned</p>			

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p style="text-align: center;">Activities</p> <p>5-1 Consider the freshness improvement policy of fisheries products</p> <p>5-1-1 Understand the present condition of the freshness of captured products</p> <p>5-1-2 Consider the standardization of the quality</p> <p>5-1-3 Examine the handling method of captured products onboard</p> <p>5-1-4 Examine the improvement of fishing methods.</p> <p>5-2 Transfer new technology to the fishermen in order to improve the freshness of fisheries products</p> <p>5-2-1 Elaborate educational materials</p> <p>5-2-2 Promote fisheries organizations to accept the new handling methods</p> <p>5-2-3 Hold the workshops for the fishermen</p> <p>5-3 Investigate the improvement situation in the quality control</p> <p>5-3-1 Evaluate new technology and implementation process</p> <p>5-3-2 Recommend to the Ministry of Health the establishment of national policies on quality control</p> <p>5-4 Instruct the quality control in fisheries communities.</p>			

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Activities</p> <p>6-1 Consider the freshness improvement policy in a circulation stage</p> <p>6-1-1 Investigate and evaluate the present condition of the freshness in a circulation stage</p> <p>6-1-2 Improve handling methods</p> <p>6-1-3 Evaluate the improvement of handling methods</p> <p>6-2 Train traders</p> <p>6-2-1 Hold workshops for traders</p> <p>6-2-2 Elaborate educational materials</p>	<p>INPUT</p> <p>Japanese side</p> <p>Long-term experts</p> <p>Leader /fisheries policy Coordinator</p> <p>Quality control</p> <p>Resources management</p> <p>Short-term experts</p> <p>Equipment provision</p> <p>C/P training</p>	<p>Costa Rican side</p> <p>C/P</p> <p>UNA (Puntarenas)</p> <p>INCOPECA</p> <p>Place, office, center for research (Punta Morales) (Puntarenas) (San Jose)</p> <p>Operating budget assigned</p> <p>UNA , INCOPECA</p>	<p>Previous Conditions</p> <p>Institutions cooperate in the project</p>

**CARTA DE INTENCIONES ENTRE LA UNIVERSIDAD
NACIONAL Y EL INSTITUTO COSTARRICENSE DE PESCA
Y ACUACULTURA, PARA EL DESARROLLO DEL PROYECTO
"ADMINISTRACIÓN PESQUERA PARA PESQUERIAS
SOSTENIBLES".**

Nosotros *Senia Marta Mora Escalante*, mayor, casada, costarricense, Doctora en Letras, vecina de San Francisco de Dos Ríos, San José, cédula de identidad, uno-cuatrocientos doce-mil cuatrocientos setenta, actuando en mi condición de Rectora y Representante Legal de la Universidad Nacional, entidad con cédula jurídica número cuatro - cero cero cero - cero cuatro dos uno cinco cero uno cuatro, en adelante y para los efectos del presente contrato denominado como la UNIVERSIDAD, y *Herbert Nanne Echandi*, mayor, casado una vez, Profesional en Biología, vecino de Bello Horizonte, Escazú, cédula de identidad uno - trescientos treinta y uno - cero cero siete, en calidad de Presidente Ejecutivo del Instituto Costarricense de Pesca y Acuicultura, cédula jurídica número cuatro - cero cero cero - uno cinco tres cero cero cuatro, personería que consta en el Registro Público Sección de Personas, al tomo ciento treinta y cinco, folio doscientos noventa y cuatro, asiento ochocientos ochenta y uno, en adelante denominado INCOPECA, y

CONSIDERANDO QUE:

1. Existe un Convenio de Cooperación entre la Universidad Nacional y el Instituto Costarricense de Pesca y Acuicultura firmado en noviembre de 1994.
2. Ambas instituciones manifiestan su interés de aunar esfuerzos y recursos para la implementación del proyecto "Manejo pesquero para pesquerías sostenibles", en el marco de la cooperación con el Gobierno de Japón.

POR TANTO ACUERDAN:

Celebrar la presente Carta de Intenciones, la cual se regirá por las siguientes cláusulas:

Cláusula 1. Objetivo.

- 1.1 El objetivo de la cooperación que las partes buscarán ejecutar conjuntamente es el proyecto "Administración pesquera para pesquerías sostenibles" que tiene como propósito el desarrollo de acciones integradas que promuevan la pesca artesanal sostenible y que contribuyan al mejoramiento de la calidad de vida de las comunidades costeras del Golfo de Nicoya, contando para ello con la cooperación del Gobierno de Japón.

Cláusula 2. Administración de la iniciativa conjunta

Las Partes están conscientes que la presente iniciativa podrán regirse según lo que se estipula en las siguientes cláusulas:

2.1 Las Responsabilidades de INCOPESCA podrían definirse de la siguiente forma:

- a) Buscar una persona como Administradora del proyecto quien será responsable del manejo de los asuntos administrativos y técnicos del proyecto, en lo referente a INCOPESCA.
- b) Buscar una persona como Coordinadora del Proyecto, quien tendrá a cargo la supervisión diaria de los aspectos técnicos y de los asuntos administrativos relacionados con la implementación del proyecto.
- c) Buscar personal profesional contraparte para cada experto japonés, según los requerimientos indicados en la formulación del proyecto de cooperación internacional.
- d) Proveer facilidades para la implementación del proyecto como: apoyo logístico, uso de instalaciones, según sea establecido en la planificación anual para la ejecución del proyecto.

2.2 Las Responsabilidades de la UNIVERSIDAD podrían definirse de la siguiente forma:

- a) Buscar una persona como Director (a) de Proyecto, quien será responsable de la administración y seguimiento del proyecto.

- b) Buscar una persona como Administradora del proyecto quien será responsable del manejo de los asuntos administrativos y técnicos del proyecto, en lo referente a la UNIVERSIDAD.
- c) Buscar una persona como Coordinador (a) del Proyecto, quien tendrá a cargo la supervisión diaria de los aspectos técnicos y de los asuntos administrativos relacionados con la implementación del proyecto.
- d) Buscar personal profesional contraparte para cada experto japonés, según los requerimientos indicados en la formulación del proyecto de cooperación internacional.
- e) Buscar asignar el personal administrativo requerido para atender las necesidades del proyecto.
- f) Proveer el espacio, y el equipo y materiales básicos y brindar apoyo logístico requeridos para la ejecución del proyecto, según sea establecido en la planificación anual para la ejecución del proyecto.

2.3 Para la efectiva y exitosa implementación del proyecto se establecerá un Comité Coordinador, con representación de la cooperación japonesa y de la contraparte costarricense.

2.4 Este Comité Coordinador estará constituido por:

- a) El Director de Proyecto, perteneciente a la UNIVERSIDAD, quien ejerce la coordinación general.
- b) El Consejero de Proyecto, de la cooperación japonesa.
- c) Los Administradores de Proyecto, de la UNIVERSIDAD como de INCOPECA.
- d) Los Coordinadores de Proyecto de la cooperación japonesa, de la UNIVERSIDAD y INCOPECA.
- e) Los expertos japoneses y sus contrapartes costarricenses.

- f) Un representante de la Comisión de Desarrollo y Conservación del Golfo de Nicoya.

2.5 El Comité Coordinador se reunirá al menos una vez al año y tantas veces como sea necesario por convocatoria del Director de Proyecto, o a solicitud escrita de una de las partes: cooperación japonesa, UNIVERSIDAD o INCOPESCA.

2.6 El Comité Coordinador podrá tener las siguientes funciones:

- a) Formular el plan anual de trabajo del proyecto.
- b) Evaluar la ejecución del plan anual de trabajo.
- c) Preparar el presupuesto anual del proyecto, relativo a la contraparte costarricense.
- d) Conocer y tomar decisión acerca de los asuntos de mayor relevancia del proyecto.
- e) Dar seguimiento académico al proyecto
- f) Otras funciones que el mismo Comité defina.

Cláusula 3. Derecho de propiedad intelectual.

Se tendrá por entendido que la titularidad de los derechos de propiedad intelectual que surjan al amparo de la presente Carta de Entendimiento deberá ser regulada en contratos específicos celebrados al efecto.

Cláusula 4. Notificación.

Todos los avisos y otras comunicaciones, en virtud del presente instrumento, serán por escrito y entregados a las siguientes personas:

En la UNA:

Señor Rector o Señora Rectora

Universidad Nacional

Apdo. Postal 86-3000

Teléfonos: (506) 277-3901 / 277-3900

Fax: (506) 237-7593

Copia a:

Señor Decano o Señora Decana
Facultad de Ciencias Exactas y Naturales
Teléfono: (506) 277-3426 / 277-3426
Fax: (506) 277-3485


En INCOPESCA:

Presidente Ejecutivo
INCOPESCA
Teléfono: (506) 220-3952
Fax: (506) 296-2662

Cláusula 5. Vigencia.

La presente Carta de Intenciones tendrá una vigencia de cinco años a partir de su firma, prorrogándose por períodos iguales sin necesidad de gestión o trámite alguno, cuando no exista declaración contraria y por escrito, de al menos una de las partes, dentro de los treinta días anteriores a la fecha del vencimiento. Además, en cualquier momento, las partes podrían darla por terminada. No obstante, e independientemente del motivo de la terminación, los programas, proyectos y actividades que se estén realizando en ese momento, continuarán hasta la fecha programada y aprobada de conclusión.

En prueba de conformidad, los representantes firmamos cuatro ejemplares de un mismo tener y efecto.


MSc. HERBERTH NANNE ECHANDI
PRESIDENTE EJECUTIVO.
INCOPESCA


DRA. SONIA MORA ESCALANTE
RECTORA
UNIVERSIDAD NACIONAL



Lugar y Fecha San José 9-11-01

Heredia,
Lugar y Fecha 9. XI. 2001

1-4 Elaborate the plan of resources management	1-5 Discuss on the plan in the organs concerned	1-5-1 Check the plan 1-5-2 Coordinate with other organizations concerned through the cooperation with CDCGN	Review periodically the contents of the resource management plan Hold a meeting of the CDCGN in 2 or 3 months interval to discuss on activity reports and future activities	UNA, INCOPECSA	UNA
2. The fisheries resources management plan is appropriately implemented.	2-1 Make it well-known to the fishermen the resources management concept	2-1-1 Create educational materials 2-1-2 Promote fishermen's organization 2-1-3 Hold workshops for fishermen.	Elaborate simple materials for fishermen Hold a meeting periodically with the representatives of fishermen's associations to discuss on the resource management of the Gulf of Nicoya Carry out a workshop (lecture or training) periodically for fishermen	UNA, INCOPECSA	UNA
3. The fisheries resources management plan is periodically updated.	2-2 Manage the artisanal fishery organizations	2-2-1 Watch the activities of the illegal fishery 2-2-2 Design and suggest the supporting system for the fishermen	Periodical questionnaire and field observation are carry out. Elaborate document, hold meeting and support technically	UNA, INCOPECSA	UNA
	3-1 Monitor fishing activities 3-2 Monitor fisheries resources 3-3 Investigate the enforcement situation of the plan 3-4 Discuss on the revision of the plan in the organs concerned		Inquire of fishermen periodically whether they are performing fishery activities based on the resource management plan Examine on fishing amount and size of fished species to compare with the past data Examine the resource management plan based on the results obtained Improve the plan after the discussion on the above-mentioned results	UNA, INCOPECSA	UNA, INCOPECSA

Plan of Operation (Quality Control)

Out put	Activity (Big item)	Activity (Small item)	Content of Activities	1 2 3 4 5					Implementing Organizations	Responsible Organizations
				1	2	3	4	5		
4. A safety improvement policy of shellfishes is drawn up	4-1 Grasp the present condition of contamination and shellfish toxin accumulation	4-1-1 Fix the data of the past	Fix the data of the past (UNA, MAG and INCOPECSA)						UNA INCOPECSA (CMR)	UNA
		4-1-2 Analyze the contaminants of shellfishes	Analyze toxic substances (arsenic, cadmium, lead, mercury)						UNA, INCOPECSA (MAG)	UNA
		4-1-3 Analyze the shellfish toxins caused by red tide	Count the number of the toxic fitoplankton in seawater of 6 stations. (Muella Puntarenas, Punta Molares, Tarcoles, Isla de San Lucas, Isla de Cedros, Isla de Chira)						UNA INCOPECSA (CMR)	UNA
	4-2 Propose solution	4-2-1 Monitor contaminants and shellfish toxin accumulation	Investigate on the toxin of shellfish by means of mouses.						UNA (MAG)	UNA
			Culture the toxic fitoplankton and investigate on the level of toxicity						UNA	UNA
		4-2-2 Transmit the results of monitoring and the counter measures to the organs concerned	Establish the standard number of fitoplankton and accumulated amount of toxin in the flesh of molluskos.						UNA; (MAG) (MS)	UNA
5. A freshness improvement policy of fisheries products is spread	5-1 Consider the freshness improvement policy of fisheries products	5-1-1 Understand the present condition of the freshness of captured products	Discuss periodically with MAG and the Ministry of Welfare.						UNA; INCOPECSA (CMR)	INCOPECSA
			Design contingency program for intoxication risk in coordination with other institutions						UNA; (CMR); (CDCGN)	INCOPECSA
		5-1-2 Consider the standardization of the quality	Examine the freshness of fished products. (Sensory, physical, bio-chemical and microbiological methods)						UNA	UNA
	5-1-3 Examine the handling method of captured products onboard	Freshness evaluation of captured products by organoleptic test.						UNA	UNA	
		Establish the physical, bio-chemical and microbiological standards for the captured products						UNA	UNA INCOPECSA	
			Characterization and documentation the handling of captured products on board (freshness, quality, sanity, handling, etc.)					UNA INCOPECSA	UNA INCOPECSA	
			Determine the handling practices effects on the fisheries products quality using the microbiological, physico-chemical parameters.					UNA	UNA	

	5-1-4 Examine the improvement of fishing methods.	Determine the improvement methods to ensure the quality according to the fishing methods. Develop technologies to improve the freshness. Develop a quality inspection system on board.	UNA INCOPECSA	UNA	UNA
5-2 Transfer new technology to the fishermen in order to improve the freshness of fisheries products	5-2-1 Elaborate educational materials	Prepare the text that the fishermen can understand.	UNA	UNA	UNA
	5-2-2 Promote fisheries organizations to accept the new handling methods	Carry out periodically the exchange of opinion with fishermen. Inform about the importance of fish quality to the fishermen. Promote the new technologies using radio and television sets. Publish bulletin information	UNA INCOPECSA	UNA	UNA
	5-2-3 Hold the workshops for the fishermen.	Training of fishermen is executed. Train public servants	UNA	UNA	UNA
5-3 Investigate the improvement situation in the quality control	5-3-1 Evaluate new technology and implementation process	Examine the present status of freshness and quality of the products. (organoleptic test, sanitary check, bacterial examination, etc.)	UNA INCOPECSA	UNA INCOPECSA	UNA INCOPECSA
	5-3-2 Recommend to the Ministry of Health the establishment of national policies on quality control	Discuss with the related institutions the establishment of national policies on the quality control in order to improve the freshness	C/DCGN UNA INCOPECSA	C/DCGN UNA INCOPECSA	C/DCGN UNA INCOPECSA
5-4 Instruct the quality control in fisheries communities.		Incorporate the involved institutions in the trainings plans through the C/DCGN	UNA INCOPECSA	UNA INCOPECSA	UNA INCOPECSA
6. The freshness improvement policy of fisheries products in a circulation stage is spread.	6-1 Consider the freshness improvement policy in a circulation stage	Examine the present status of freshness and quality of the products. (organoleptic test, sanitary check, bacterial examination, etc.) in a circulation stage.	UNA	UNA	UNA
	6-1-2 Improve handling methods	Decide the improvement methods from the above mentioned results	UNA INCOPECSA	UNA INCOPECSA	UNA INCOPECSA
	6-1-3 Evaluate the improvement of handling methods.	Monitor the fisheries products freshness through the sensory, physical, chemical and microbiological methods.	UNA	UNA	UNA
	6-2 Train traders	6-2-1 Hold workshops for traders	Execute the training workshops for the traders.	UNA INCOPECSA	UNA INCOPECSA
	6-2-2 Elaborate educational materials	Hold the seminar for commercials on the basic knowledge of quality and sanitary management.	UNA INCOPECSA	UNA INCOPECSA	UNA INCOPECSA

ANNEX 5 The Budget Allocation of UNA and INCOPECA for The Project

(1) Prospective Budgets for 5 years (EBM)

(Unit: US\$)

	I	II	III	IV	V
Personnel	42,800	42,800	42,800	42,800	42,800
Secretary	5,400	5,400	5,400	5,400	5,400
Vehicles	30,000	-	-	-	-
Basic services	1,000	1,000	1,000	1,000	1,000
Trips	3,580	3,580	3,580	3,580	3,580
Research vessels	7,000	7,000	7,000	7,000	7,000
Subtotal	89,780	59,780	59,780	59,780	59,780
Total	328,900				

- Budgets of Vehicles for II to V year cannot be estimated because of the annual fluctuation of gasoline price.

(2) Prospective Budgets for 5 years (INCOPECA)

(Unit: US\$)

Year	I	II	III	IV	V
Personnel	36,358	36,358	36,358	36,358	36,358
Vehicles	30,000				
Trips	3,580	3,580	3,580	3,580	3,580
Research Vessels	7,000	7,000	7,000	7,000	7,000
Subtotal	76,938	46,938	46,938	46,938	46,938
Total	264,690				

- Budgets of Vehicles for II to V year cannot be estimated because of the annual fluctuation of gasoline price

PROJECT IMPLEMENTATION STRUCTURE

