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DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations  
For the Review of the  
Development Loan Committee

COLOMBIA - FISHERIES RESEARCH LOAN

514-22-220-191

Loan 514-T-78

AID-DLC/P-2086

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May 23, 1975

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Colombia - Fisheries Research Loan

Attached for your review are the recommendations for authorization of a loan to the Government of Colombia ("Borrower") in an amount not to exceed two million two hundred thousand United States dollars (\$2,200,000) to assist in financing the United States dollar and local currency costs of the Borrower's program in fish production and marketing of fish.

No meeting is scheduled for this proposal. However, please advise us of your concurrence or objection as early as possible, but in no event later than Wednesday, June 4, 1975. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee  
Office of Development  
Program Review

Attachments:

Summary and Recommendations  
Project Analysis  
ANNEXES I - II

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C O L O M B I A

FISHERIES RESEARCH LOAN

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FISHERIES RESEARCH LOAN

SUMMARY AND RECOMMENDATIONS

A. Borrower and Implementing Agency

The Borrower will be the Government of Colombia (GOC) represented by the Minister of Finance, the Minister of Agriculture, and the Director of the National Planning Department (DNP). The Implementing Agency will be the Natural Resources Institute (INDERENA), an autonomous government agency attached to the Ministry of Agriculture which is responsible for the administration, conservation, and development of inland and ocean fishing, national parks, river basins and national forests.

B. The Amount and Terms of the Loan

An A.I.D. loan not to exceed US\$2.2 million is proposed. The loan will be repayable in 40 years, including a grace period of 10 years. The interest rate will be two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.

C. Program Goal

The program goal is to improve the nutritional well-being of the Colombian population, particularly those groups with the fewest resources. The sub-goal of the program is to increase the production of fresh water fish, which is viewed as an attractive, low-cost alternative protein source, thereby increasing the income of small farmers and artisan fishermen.

D. Project Purpose

The purposes of the project are to help develop economically and technically sound aquaculture systems suitable for small farmer use, and to produce management recommendations designed to rationalize the exploitation of the fish population of the lower Magdalena River that will be appropriate for use by artisan fishermen.

E. Background

The Government of Colombia has pledged itself to making substantial progress toward solving the problems of malnutrition and under-nutrition which afflict approximately 93 percent of Colombian families in varying degrees. The basic document which provides a strategy for future GOC actions, the recently completed National Food and Nutrition Plan, has

identified protein deficiency as one of the most persistent problems associated with malnutrition, one which must be given immediate attention. Because fish can be an attractive, low cost protein alternative, the Plan assigns top priority to increasing fish production as one of the strategies for dealing with this problem.

This strategy has a number of attractive features. First, fish have natural advantages as a source of protein. Being cold blooded and living in an environment which supports them, fish expend no calories on maintaining a constant body temperature. Thus, they are more efficient feed converters (by a factor of one and one-half to two times) than other commonly accepted sources of animal protein. Second, fish may be profitably cultivated, employing relatively more labor than other types of farming and utilizing relatively less land than would be required for production of other livestock, land which is frequently of marginal value, such as swamps and saltwater marshes which are not suited to other uses. Thus, aquaculture is appropriate to factor proportions frequently found in Colombia. Finally, Colombia appears to have considerable potential for increased exploitation of natural bodies of inland water such as the Magdalena River.

Some tentative research work has been done in Colombia to develop aquaculture systems but progress has been handicapped by lack of adequate research facilities and trained personnel. Lack of these same factors is also inhibiting rationalization of exploitation of the Magdalena River, the single most important source of fish protein in Colombia.

#### F. Description

Loan funds would be used to construct and equip fishculture stations at Repelón on the North Coast, at a site along the Upper Magdalena River, and at a site in the Eastern Plains (The Llanos). These stations will conduct the research necessary to develop aquaculture systems for use primarily, but not exclusively, by small farmers. Loan funds would also be used to construct and equip a station at Magangué on the Lower Magdalena River which would carry out research directed towards identifying a package of improved management practices for use by artisan fishermen in order to rationalize the exploitation of the river.

The loan also contains components which would finance technical assistance in the fields of aquaculture, research station management, and lake and river management. Owing to uncertainty concerning the future role of the United Nations Food and Agriculture Organization in Colombia, the Mission feels that a U.S. University will be the most likely source of the needed technical assistance.

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Long-term academic training, primarily to the Masters level, and some special short courses will be financed for personnel from INDERENA and other entities such as universities which are working in the fields of aquaculture and fisheries management improvement. A number of formal, in-country short courses will also be financed.

Finally, loan funds would be used to finance a portion of the program operating costs and a number of contracts between INDERENA and various universities, regional development corporations, and other public and private entities engaged in research directed toward increasing inland fish production. Through this mechanism, the expertise of these organizations will be tapped in order to carry out a number of specific studies and field trials.

The A.I.D. loan proposes to support the research activities that are a necessary first step in coming up with technology packages and river management recommendations. At a future date, not contemplated in this loan, the extension of the technology packages and the implementation of the fish management recommendations will take place. The GOC has indicated it will provide the necessary support and resources once those needs develop.

G. Summary Financial Plan

The following table indicates the proposed use of loan funds and the intended contribution of the GOC:

Table 1

(US\$000)

<u>Project Elements</u>	<u>A.I.D. Loan</u>	<u>GOC Contribution</u>	<u>Total</u>
Equipment	515	--	515
Training	410	--	410
Technical Assistance	580	--	580
Operating Costs (Construction & Research)	695	1,083	1,778
Total	<u>2,200</u>	<u>1,083</u>	<u>3,283</u>

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The Mission estimates that approximately 68 percent of the A.I.D. loan funds will be used for foreign currency procurement (AID Geographic Code 941 sources), for equipment, technical assistance and training. In addition, an unidentified portion of INDERENA's operating costs will also result in indirect foreign exchange expenditures. As indicated in the table above, the A.I.D. loan will support 39.1 percent of INDERENA's operating costs; the GOC will provide the remaining US\$1,083,000 (or 60.9 percent) as its contribution to the project.

#### H. Alternative Sources of Finance

The IBRD, the IDB, and the Eximbank have been advised of the proposed loan and have indicated no interest in providing the necessary financing.

#### I. Other Donor Activity

There is a possibility that the United Nations Food and Agricultural Organization will be interested in providing at least a portion of the estimated US\$580,000 in technical assistance, but a final decision is pending termination of the evaluation of its Colombian program and probably will not be made until June 1975. Funds from the proposed loan to provide technical assistance and short-term training will only be used if adequate assistance is not available from other sources.

#### J. Views of the Country Team

The successful outcome of a research program can never be guaranteed, owing to a wide range of uncertainties. However, the success experienced by other countries in developing aquaculture programs and in rationalizing the exploitation of their natural bodies of water makes the Mission reasonably confident that the research proposed in this paper will be brought to a successful conclusion and that the desired technical packages will be forthcoming.

The successful termination of the activities proposed would have the important long-range effect of increasing the production of a relatively inexpensive and efficient source of animal protein and, as such, would make a substantial contribution to the GOC's goal of improving the nutritional status of its citizens.

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K. Loan Administration

Standard A.I.D. loan disbursement and procurement procedures are expected to be followed. Engineering and construction will be contracted for. Standard procedures will apply to equipment and vehicle procurement and to contracting for technical assistance.

L. Statutory Criteria

All statutory criteria have been met (See Annex I, Exhibit 1).

M. Issues

All issues raised in the DAEC instruction cable have been dealt with in the body of the CAP.

N. Recommendation

On the basis of the conclusions of the Capital Assistance Committee that the project is technically, economically, and financially sound, it is recommended that a loan be authorized to the Government of Colombia in an amount not to exceed US\$2.2 million, subject to the following conditions:

1. Conditions Precedent

In addition to the normal conditions precedent to disbursement, the following shall be required:

- a. Prior to the issuance of any commitment document or to any disbursement under the loan:
  - (i) INDERENA shall submit a time-phased project implementation plan which shall include a schedule showing how the construction, training and technical assistance components of the project will be coordinated; and
  - (ii) INDERENA will submit its Technical Assistance Plan to USAID for its approval. This plan shall list the kinds of technical assistance desired and their proposed sources.
- b. Prior to AID issuance of any commitment documents for participant training, INDERENA shall form a Participant Selection Committee in which AID shall be represented.
- c. Prior to AID disbursement of any funds for construction for a given subproject, INDERENA shall submit all pertinent construction plans, designs, specifications and final cost estimates to AID for its approval.

2. Covenants

- . INDERENA shall covenant that it will present in a timely fashion the annual research plan for each station funded under this loan to USAID for its approval.
- . The Borrower shall covenant that such technical packages as may be forthcoming as a result of the research financed by this loan will be disseminated to the appropriate target groups by the appropriate extension agents and that all other steps necessary to the implementation of those packages will be taken.
- . The Borrower shall covenant that the existing Project Committee composed of representatives of DNP, the Ministry of Agriculture, and USAID will continue to serve as the coordinating group for project implementation.
- . INDERENA shall covenant to continue to give consideration to the environmental impact of the project on lake and river management practices and to foster appropriate environmental practices among the fish farmers who will, over time, participate in this project.

0. Capital Assistance Committee:

Dwight Steen - Chairman  
Todd Crawford - Loan Officer  
James Fox - Economist  
James Kearney - Engineer  
Agapito Olea - Agricultural Advisor  
David Peacock - Chief, Rural Development Unit  
Douglas Robertson - Lawyer  
Lawrence Hausman - Loan Officer AID/W

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I. NATURE OF THE PROJECT

A. Project Rational

1. Program Goal

The program goal is to achieve the progressive nutritional well-being of the Colombian population - particularly of those segments with the fewest resources - by satisfying its basic dietary necessities with respect to quantity and quality of food consumed. The sub-goal of the program is to increase the production of fresh water fish, which is viewed as an attractive, low cost alternative protein source.

2. Project Purpose

The purpose of the project is to develop economically and technically sound aquaculture systems suitable primarily, but not exclusively, for small farmer use, and to produce a package of management recommendations designed to rationalize the exploitation and, thus, ensure the persistence of the fish population of the lower Magdalena River, a package which will be appropriate for use by artisan fishermen.

3. The Problem

The magnitude of the nutritional problem faced by GOC planners can be established based on the findings of several recent studies. The Technical Research Institute (IIT) study of all major cities indicated that households of more than three persons with income of 500 to 1000 pesos (US\$52.27) could not afford a least-cost diet devised to provide the family's minimum nutritional requirements. Approximately 41 percent of urban consumers or 4.4 million Colombians are believed to fall within this category.

Corroborating evidence is provided by a National Statistics Department (DANE) study which found that a market basket (which would provide minimum nutritional needs) for a typical family of three adults and four children costs 1500 pesos (US\$78.40)\* monthly in major cities and surrounding rural areas. Since 78.4 percent of urban households receive less than 1500 pesos income per month, large numbers of urban families cannot afford a minimum acceptable diet. A corresponding Ministry of Health study for typical rural families places the cost of an adequate diet at 1250 pesos (US\$65.33). \*Approximately 77 percent of the rural population cannot afford food expenditures of this magnitude.

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\* / 1970 Prices

The following table presents the recommended average protein requirement per capita per day and the protein availability in Colombia in 1959-61 and 1971-72. (Source: Colombian Institute of Family Welfare):

Table 1 - Recommended and Actual Protein Consumption

	<u>Recommended</u>	<u>Actual</u>	
		<u>1959-61</u>	<u>1971-72</u>
		(In grams per capita per day)	
Total average	57.3	53.0	45.0
Animal protein	19.1	22.0	18.9
of which: dairy products		9.5	8.0
beef		7.2	6.5
fish		0.5	0.9

The table shows that Colombia clearly has a protein deficiency and that the problem has been worsening over time. The problem is significantly more serious when one considers the unequal distribution of protein among the population. Furthermore, of the animal protein consumed, more than three quarters of the total was in the form of beef and dairy products. These are both less efficient sources of protein than alternatives, such as fish.

#### 4. The Proposed Strategy

##### a. The Setting

Pursuant to the GOC concerns, a group of six inter-agency, inter-disciplinary committees was established in order to analyze the causes of malnutrition and its effects, the groups most affected and the most effective points of intervention. In January 1976, the National Food and Nutrition Plan was presented to and approved by the Economic and Social Policy Council making it official government policy. The two basic objectives of the Plan are:

To assure adequate nutrition of the population with the fewest resources -- especially mothers and infants; and

B. To achieve a progressive nutritional well-being of the population, satisfying its basic necessities with respect to quantity and quality.

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The 26 specific projects developed to achieve these objectives are discussed in the Plan and may be aggregated under seven general headings:

1. Direct intervention in consumption patterns -- principally programs of supplemental feeding.
2. Production of processed foods of low cost and high protein content, such as enriched pastas.
3. Production increases of basic foods for direct consumption, such as milk, soybeans, fish, etc.
4. Improvement in food processing facilities and marketing infrastructure.
5. Preventive and curative health programs to achieve better biological utilization of food among the poor.
6. Nutritional education and training of human resources.
7. Research and evaluation of on-going and proposed nutrition.

The fisheries activities to be supported by the proposed loan form an element of the third category of projects, measures to increase basic food production. Within the general heading of fisheries development, the GOC has identified three specific projects.

1. Development of aquaculture;
2. Promotion of processing of fish into dried and salted forms, and
3. Exploitation of incidental fish catch.

Development of aquaculture and promotion of processing have been assigned first priority by the GOC, and exploitation of incidental fish catch, second priority. These three specific projects clearly fall within the general category of programs designed to affect the supply side of the equation rather than to achieve a direct impact on the demand side.

In addition to the Nutrition Plan, the GOC has a fisheries development policy, which in order of priority states the objectives to be:

1. Increase the average per capita consumption of protein in the country.

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2. Increase the income of the artisan fishermen.

3. Assurance that the necessary ecological conditions exist to achieve the above objectives.

The strategies of the GOC for achieving the above objectives include:

1) To obtain, in the minimum possible time, the maximum development of both marine and inland fisheries, through increases in production and productivity and through improvements in technological and economic efficiency of this activity.

2) To increase the rational utilization of the fisheries resources of the country.

3) To diversify the national fisheries production.

4) To increase the investment in fisheries research.

5) To create a national consciousness regarding the fisheries situation by strengthening the official administration of the resources and through closer coordination among private and public entities involved in fisheries development.

b. The Target Group

Since the major thrust of the project is the development of economic aquaculture practices, the first group of beneficiaries will be those small farmers who adopt the technological package derived from the research. These farmers should benefit both from improved family nutrition as a result of home consumption, and increased incomes from sales of fish as they expand the productive capacity of their ponds. As widespread development occurs, consumers will increasingly benefit from the impact of an increased supply of fish from this source.

The lake and river management improvement portion of this loan will provide direct future benefits to the majority of the 200,000 artisan fishermen of Colombia. Since approximately 60 percent of the fish consumed in Colombia come from inland waters the GOC estimates that the majority of artisan fishermen are actively fishing in inland waters. These fishermen will benefit from the use of improved fishing techniques designed to assure continuance, if not increases in the present levels of production. These improved techniques will be developed as a result of research funded under this loan.

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In the future, and as a result of the preparatory work to be accomplished in both elements of this project, consumers should expect to benefit from increased availability of fish. The distribution of consumer benefits by income group is difficult to estimate since this will depend on, inter alia, what production increases are feasible, how much retail prices can be lowered, and how consumption patterns will evolve among various income groups. Clearly, however, there is a specific desire by both the GOC and AID to reach lower income consumers with fish protein at price levels those groups can afford.

The linkage between the increased production of the fish species contemplated in this project and the increased consumption of such fish by the target groups is admittedly not clear. There are possible constraints on the side of production (marketing and distribution) as well as on consumption. As regards the former, a complementary effort to analyze and address the marketing and distribution constraints will be undertaken during the same time frame as the loan. As regards the latter, based on historical patterns of consumption, the varieties of fish that will be cultivated and the varieties being caught in inland waters are consumed principally by lower income urban groups. Both the GOC and the Mission expect that this pattern will continue for the foreseeable future.

Furthermore, as part of the process of refining the National Food and Nutrition Plan, the GOC will undertake studies on consumer attitudes towards various foods. This activity will also be expanded under the AID Nutrition Loan proposal contemplated for FY 76.

c. The Alternatives

Aquaculture, defined as the farming and husbandry of freshwater and marine organisms, is a very old and often highly productive management practice. Aquaculture yields typically range upwards of five times the output that would occur under natural conditions, and output gains ten or more times natural production rates are not uncommon given proper management.

The culturing of fish offers some attractive technical advantages over alternative means of producing animal proteins. For several reasons a pound of fish should be produced more cheaply than a pound of red meat. Fish, being cold blooded, take on the temperature of their environment and therefore save the calories otherwise required to maintain a constant body temperature. Also, fish live in a physical environment that supports them, while land based animals must use a good deal of energy to develop a skeletal system and to support themselves against gravity. Consequently, fish are better feed converters than land-based animals. Feed conversion rates for fed fish are about one and one-half times as great as for swine or chickens and about twice as great as for cattle or sheep (Bardaoh, 1972).

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Also, fish can be crowded more closely than land-based animals because the habitat of fish is three dimensional in nature. Thus, in a well managed environment, 2,000-3,000 kilograms or more of fish can be produced per hectare per year while the maximum figure for cattle is 600 to 700 kilograms (Delaney and Schmittou). And, while some fish must be fed rations that are as expensive as cattle or poultry feedgrains, many varieties of fish and other marine organisms can live very well on nutrients found naturally in their aquatic environment, or can be fostered through fertilization of their environment, mostly by the addition of phosphates.

Aquaculture often does require more labor per unit of food output than other types of farming. Given the factor endowments in Colombia this does not represent a problem. In fact it would appear to offer an opportunity for generating badly needed employment opportunities in rural areas. A further consideration is that, in many cases, the labor required for aquaculture operations can be scheduled around the peak labor demand periods for agriculture, so that fish rearing, particularly on a small scale, can be complementary with general farming. Furthermore, the land requirements for aquaculture often permit the use of low value, marginally productive land -- ravines, swampland, saltwater marsh, or mangrove areas -- which is not well suited to other uses. While, the capital construction requirements for aquaculture facilities are often moderately expensive, the ponds often do provide incidental benefits, e.g., water conservation, supplemental irrigation, cattle watering ponds, or even flood control. In those instances, the added benefits would contribute toward offsetting the initial construction expense.

The natural advantages of fish as a protein source strongly suggest the value of encouraging increased production in protein deficient areas of the world. Wild stocks of fish already have been heavily exploited in most areas of the world and are likely to be even more heavily exploited in the coming years. Therefore, there is a need to turn to some alternative sources of supply. Wild stocks of fish are finite in amount. Given the rising world demand for protein, the U.S. National Marine Fisheries Service has estimated that maximum sustainable yields of salmon, halibut, groundfish, oysters, and lobsters will be reached or exceeded by 1985, and most of the remaining species of commercial importance (except sardines, scallops and herring) will reach that level by the year 2,000.

Judging from the above, aquaculture seems a highly attractive potential source of fish protein. Particularly attractive would be those species of fish which are popular among consumers, low on the food chain, hardy, easy to cultivate and fast growing. Species such as carp, tilapia, milkfish, mullet, and mussels fulfill most of the above requirements and would receive the largest concentration of aquaculture effort and attention. If this is done, aquaculture is bound to make an increasingly important contribution to future protein production.

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As evidenced in the findings of the National Food and Nutrition Plan, the GOC is aware of the benefits that could accrue from these activities and has determined to focus its attention and resources on this alternative. The proposed loan would support the research and training activities that are a logical first step in the direction of wide-scale adoption of aquaculture practices.

d. The Proposed Mechanisms

One of the mechanisms this project proposes to support is the development of the aquaculture potential in Colombia. The development of that potential requires an initial investment in applied research and demonstration infrastructure in order to permit the subsequent adaptation of known aquaculture systems to local species and conditions. An economically and technically sound production system must then be developed before extension can begin. Also, the limited hatchery capacity which currently exists must be expanded to supply eggs and fingerlings to potential aquaculturalists.

The other mechanism proposed is that of increasing the production of existing inland water fisheries through improved management of these natural resources. According to one expert, increases on the order of 50 to 100 percent of current production are possible if certain critical information was available. These include determination of fish population dynamics, assessment of the catch and appropriate fishing techniques. The proposed loan would support related research activities.

The realization of the technical packages to be developed will not likely occur until very near or after the TDD of the proposed loan. Therefore, no loan funding is being proposed for either credit or extension. However, the Mission and the GOC are cognizant of the importance of an extension program and credit availability to spread the research results developed under the proposed loan to small farmers. The Mission and the GOC also agree that use should be made of the existing extension and credit infrastructure, rather than creation of new outreach mechanisms specifically for aquaculture. The GOC has made it clear to the Mission in their application that it is their intention to support these future activities (See Annex I).

The existing extension infrastructure is composed primarily of the Colombian Agricultural Institute (ICA), the Colombian Agrarian Reform Institute (INCORA), the Coffee Growers Federation and several of the Regional Development Corporations. As mentioned above, the Coffee Growers' Federation and the Cauca Valley Development Corporation are already involved in an aquaculture extension program.

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The Coffee Growers' Federation is providing credit to their members for aquaculture production. In the past, the Caja Agraria has had lines of credit for fish production. The GOC has expressed its intent to establish lines of credit in both the Caja Agraria and the Agricultural Finance Fund (FFA) for aquaculture once the technology package have been field-tested.

Funds are provided under the proposed loan for training four people at the Masters level in aquaculture extension. These people would then train the extension agents from the various agencies in general aquaculture extension as well as on the specific technologies developed under the loan.

### 5. Output Targets

The output targets of the proposed loan are that:

- a) Sites are selected and the physical facilities are constructed according to the time-phased plan presented in Annex II, Exhibit 7.
- b) Research begins according to the time-phased plan presented in Annex II, Exhibit 7.
- c) Training is accomplished according to the time-phased plan presented in Annex II, Exhibit 5.
- d) Technical assistance is provided according to the plan to be presented as a condition precedent to disbursement.

## B. Background

### 1. General

Improvements in the fishing industry in Colombia, properly focused, could offer both a source of increased income for producers and increased supply of protein for consumers. In its present state, the industry is not very effective in either generating incomes or feeding the Colombian population. The GOC estimates that there are 200,000 artisan fishermen in Colombia, approximately 3.2 percent of the labor force, deriving at least part of their income from fishing. Yet the fishing industry in Colombia currently accounts for only 0.27 percent of the GNP (1968-1972 average in constant prices). At the same time, the average annual per capita consumption of fish products is only 2.5 kilograms (1969-1973 average). This compares to the much higher consumption levels of 9 kilograms in Ecuador, 11 in Panama, and 13 in Perú, Chile and Venezuela. If per capita fish consumption in Colombia were to reach one-half that of Ecuador, current production would have to double.

The fish resources of Colombia are contained in the coastal waters of the Pacific and Atlantic oceans and in about 3.7 million hectares of rivers, backwaters, lakes, empoundments and numerous small streams (14,286 square miles).

The inland water fishery potential has never been fully evaluated. However, the commercial catch of the Magdalena River basin currently amounts to about 25,000 - 30,000 tons annually, which is more than the combined catch from both the Atlantic and Pacific oceans.

Table 2. Geographical Distribution of Fish Catch

	<u>1970</u>		<u>1971</u>		<u>1972</u>	
	Tons	%	Tons	%	Tons	%
Inland Fisheries	22,441	(51.2)	23,821	(48.8)	47,409	(62.3)
Atlantic Zone	13,665	(31.1)	15,933	(32.7)	20,049	(26.3)
Pacific Zone	7,764	(17.7)	9,019	(18.5)	8,668	(11.4)
	<u>43,870</u>	<u>(100.0)</u>	<u>48,773</u>	<u>(100.0)</u>	<u>76,126</u>	<u>(100.0)</u>

Source: FAO, INDERENA, Min.Ag. Fish Marketing Study

Table 3. Inland Fisheries - Distribution by Watershed

	Kilograms	
	<u>1971</u>	<u>1972</u>
Magdalena River	12,696,274	30,510,686
Cauca and San Jorge Rivers	8,923,914	13,954,405
Meta River	269,407	217,026
Amazon River	1,904,828	2,726,877

Source: FAO, INDERENA, Min.Ag. Fish Marketing Study

INDERENA with assistance from FAO has made a survey of the ocean fish resources of Colombia. Already there is some fear that certain marine species are being overfished in the waters off the Colombian coasts.

In more general terms there is a worldwide concern over future supplies of fish products. This is exemplified by the drive to extend territorial limits to 200 miles by many fishing countries. Estimates (FAO, 1969) indicate a maximum potential of 120 million metric tons of fish from wild stocks. Presently, around 70 million metric tons are being harvested. Projections (Bell et. al 1971), using very conservative assumptions about population and income growth, indicate that by the year 2000 fish consumption will increase by around 50 percent (wild stock species only). This consumption increase compares with a projected 67 percent growth in population. Therefore, the wild fishery stocks of the sea do not appear to offer any long-term alternative solution to the problem of supplying increased protein to the world.

In view of this overall situation and the fact that over 70 percent of current Colombian production already comes from inland waters, most experts agree that the potential for increased production in Colombia lies in the inland waters.

## 2. Fish Consumption

The Colombian Government, in recent years, has become concerned about the low level of per capita fish consumption. As a means of addressing this concern a number of production and marketing diagnostic studies have been undertaken, some with FAO assistance. In addition, sporadic efforts by IDEMA, INDERENA, CORABASTOS, EMCOPER <sup>1/</sup> and other government agencies have been directed toward improving fish marketing in Colombia. Most of such efforts have been oriented toward direct market intervention or government regulation of the activities of private middlemen.

Nevertheless, there has been little research effort to determine consumption patterns, preferences, buying arrangements or economic and institutional conditions affecting the behavior of the intermediaries in the market channel. Neither has there been any significant effort to pull together existing research results, market intervention experiences and regulatory results into a systematic evaluation of the fish production-distribution subsector which would be useful in identifying specific policy and market interventions. Some information exists, which is explored below,

<sup>1/</sup> IDEMA is an agency with responsibilities for the pricing and marketing of agricultural products.

CORABASTOS is responsible for the central wholesale market of Bogota and for other innovations in the marketing system.

EMCOPER is a mixed economy company largely in charge of freezing facilities for the marketing of agricultural products.

but the consensus is that the existing information is not adequate to design programs which would have a significant impact toward improving marketing and increasing consumption.

According to existing information, the period of the year where the highest demand for fish products occurs is during Lent. In this five week period, according to a religious mandate, fish is supposed to substitute for beef products wherever possible. On Fridays, during the Lenten Season, the mandate of the Church is to replace all beef with fish. Curiously enough, this period of high demand closely coincides with the "subienda", the highest levels of inland fisheries production.

During the Lenten Season, family consumption of fish reaches its highest weekly averages. For example, in Bogotá, where average annual family consumption per week is 0.51 lbs., during Holy Week the levels of consumption are substantially higher.

<u>Income Group</u>	<u>Holy Week Consumption (Bogotá)</u>
High	5.06 lbs./family
Middle	4.34 lbs./family
Low	3.26 lbs./family

Source: Nizar Vergara, Fish Marketing Study for Bogota

The lower income groups seem to be the most affected by religious mandate. This implies that during the rest of the year differences in consumption among income groups is even greater, with lower income groups consuming negligible quantities of fish in periods other than Lent.

Fresh water fish account for the largest portion of total fish consumption. With the exception of certain fresh water species (trout, catfish), fresh water fish are generally consumed by low income groups. The price of trout, catfish and salt water varieties is too high to be an attractive protein source for lower income groups. Therefore the quantity of total fresh water fish consumption is a reasonably accurate indicator of how much fish protein is being consumed by the target groups (excepting trout and catfish).

Despite the common belief that prices of fish are extremely variable, evidence from wholesale price data indicate that fish prices are fairly stable relative to other perishable commodities. The coincidence of the high Lenten demand and highest seasonal production seem to stabilize prices during this period. During the rest of the year the interaction of lower levels of production and apparent lower levels

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of demand cause prices to rise, but not drastically. Unfortunately, what the demand for fish would be at lower stable prices is not currently known. Also, it is not known if prices at the producer level experience greater instability than at the wholesale level, thus serving as a disincentive to production, as has been hypothesized.

In one study, it was found that there is a general preference among consumers for meat other than fish. Consumers also prefer fresh fish to frozen, canned, or dry salted products. Further, consumers do not appear to be knowledgeable about the various species marketed, and do not seem to express a preference between types of fish in their purchasing habits. In this particular study it was suggested that some of the important factors influencing the low level of fish consumption are: consumer habits, high retail prices, poor quality, irregular and inadequate supply. However, there is no data indicating which of these factors has greater influence on the consumer.

In the case of certain types of fish, such as whole catfish and other inland fish species, typically marketed under very low hygienic conditions, wholesale prices are higher than for beef products. However, since there is a consumer preference for beef its retail price is sometimes higher than the price of these fish. For example, in February, 1973 the prices were:

	<u>Wholesale</u>	<u>Retail</u>
Fish (Bagre)	21.00/Kg.	25.60/Kg.
1st Class Beef	18.20/Kg.	36.30/Kg.

The prices of marine fish (especially shrimp) are much higher than first class beef. Whole sea fish prices are from 30 to 40 percent higher, while prices for fish fillets, previously frozen and packed for supermarkets, usually range from 90-100 percent higher than first class beef.

This suggests that to reach lower income groups, inland fisheries appears to be the indicated source of fish protein. Yet given present consumer preferences, costs of production and marketing will need to be reduced to make fish competitive with beef. Exactly what is necessary to accomplish this task in terms of marketing is still unclear.

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### 3. Fish Production and Marketing

Continental fisheries are carried out in four zones: 1) Magdalena River, 2) Cauca and San Jorge Rivers, 3) Meta River and 4) Amazon River. The Magdalena River produces the highest catch and provides the product for the Bogotá market and the northern and central-western markets, including the cities of Barranquilla, Valledupar, Cúcuta, Ibagué, and Medellín. The Cauca/San Jorge Rivers provide fish to the western zone of the country, including the cities of Medellín, Pereira and Cali. The Meta River produces fish for Villavicencio and Bogotá. The Amazon River catch is sent by air to Bogotá, Cali, Medellín and Villavicencio.

The methods used in the processing and distribution of most fresh water fish are very primitive and tend to be very unsanitary. Processing of seafish is somewhat more industrialized as it is generally directed toward higher income groups.

A general description of present processing and distribution practices related to inland fisheries is as follows: river fish are captured and kept alive in traps until collection boats pass by. Sometimes when the fishing sites are situated some distance from the gathering sites, the fish are dried and salted. A high percentage of the river transportation is done without ice and under poor sanitary conditions. When the fish are unloaded in the main gathering centers they are poorly handled. Bacterial decomposition is common before fish reach the retailers. The fish are then loaded into trucks and transported to the main cities. They are then sold either directly in city markets or to intermediaries in central supply markets. The elapsed time for this process may reach as much as 76 hours.

Theoretically, this primitive system should be lower cost than a more sanitary system. But lower cost is offset by higher losses, price risks, and inefficient management and pricing practices. Also, the low volume of fish marketed creates "thin" markets and high marketing costs per unit. To correct these primitive and unhealthy methods of handling fish, more information is needed to identify the economic, institutional and technical constraints which have limited the introduction of changes into the fish marketing system. Unfortunately, previous studies have focused only on the description of these conditions and not on the factors underlying their persistence over time and the institutional changes necessary to motivate the needed marketing reforms.

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Existing marketing research has been highly descriptive. Such research is necessary but not sufficient for policy and strategy formulations. Its major weaknesses are insufficient treatment of marketing institutions, managerial problems and constraints, market coordination arrangements, consumption patterns and attitudes, and demand analysis.

Similarly, public sector programs have focused almost exclusively on market regulation or intervention. Unfortunately, existing information and government agency experience has not resulted in a clear identification of the characteristics and behavior of existing marketing agents and consumers (how they behave and why they behave as they do). Consequently, comprehensive strategies have not been developed to make the fish marketing system more efficient.

Given the present state of knowledge of fish marketing, it was decided not to include fish marketing activities in the present loan. Nonetheless, improvements in fish marketing are considered crucial to the overall development of inland fisheries. As a consequence, USAID has encouraged the GOC to undertake a comprehensive fish production/marketing analysis as a first step toward designing appropriate interventions in fish marketing.

Plans have been made for a task force to undertake a national fish consumption study, with FAO assistance. This study will probably provide the consumption information necessary for a more comprehensive fish marketing analysis. There were, however, no plans for this year to undertake additional analysis of consumer attitudes, behavior of marketing institutions, management problems or coordination arrangements in the fish marketing system. USAID has recommended to the GOC, and there appears to be general agreement, that this study should be expanded to include these additional analyses and to involve representatives of interested government agencies (IDEMA, INDEFARMA, EMACOPPA, etc.) who will likely have responsibilities for implementing marketing projects in the longer term.

The Ministry of Agriculture is presently forming a marketing policy task force in an effort to improve the coordination of marketing activities related to agricultural marketing and to improve the analytical basis for market development policies and strategies. In this effort, it has been decided that the proposed fish marketing study will be considered as a sub-project of the overall efforts of this task force. The general supervision of the study rests with the Ministry of Agriculture and the National Planning Department. This study will produce a series of projects and government policies designed to improve fish marketing, reduce fish prices and increase consumption.

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#### 4. Appraisal of Past Assistance

AID has provided assistance in the area of natural resources development since 1963. Through a PASA agreement with the National Geodetic Survey, technical and financial assistance was provided for compilation of studies and information needed to establish the base for rational exploitation of renewable natural resources. Assistance was provided in the fields of aerial photography, topography, soil and water management, forestry, parks and wildlife, fisheries and industrial activities.

Since 1970, INDERENA has been receiving AID financial assistance in the form of program loan-generated counterpart and sector loan funds. Table I-3 presents a breakdown of that assistance as applied to fisheries development through 1974. Of a total of about US\$1.3 million of AID funds, about US\$550,000 has been utilized for inland fisheries during the period 1970-74. Of this amount, US\$144,583 was released in December 1974 for inland fisheries of which US\$96,739 (or 66.9 percent) was directed toward construction of the first phase of Repelón aquaculture station. The remaining funds (US\$405,417) represent budget support to INDERENA under the sector loan mechanism. It is possible to identify AID funding at the program level (see Table I-3); however, further subdivision of expenditures must be viewed in terms of commingled peso funds. Over this period total peso equivalent expenditures on inland fisheries amounted to US\$951,000. About 85 percent of these expenditures have been directed toward basic biological research. The remaining 15 percent covered the general administrative costs of the program.

Inland fisheries research has consisted largely of basic biological studies of several major species such as Bocachicc, Nicuro, Bagre, Pintado, Pátalo, Mojarra, Rainbow Trout, and Lisa. One of the major accomplishments has been the induced spawning of Bocachicho, a prerequisite for culturing species.

Work in expanding upon this basic knowledge into the area of development of the inland fisheries has been limited by lack of physical facilities for applied research and trained personnel in aquaculture. Presently, the Tota-Berlin stations (in the highlands) are the only locations where applied research of any type could be pursued. Consequently, available research findings are most advanced for the rainbow trout which is well suited to highland areas.

In addition, INDERENA has developed a method of obtaining catch statistics for both inland and marine fisheries. Such statistics have been gathered on the marine fisheries and from the Magdalena River Basin (the most important inland fishery) for the last five years. INDERENA has made an evaluation of the costs and methods of fishing

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TABLE I-3. EXPENDITURES OF FISHERIES UNIT BY ITEM AND SOURCE 1969-1974  
( US\$ 000 )

	<u>GOC</u>	<u>AID</u>	<u>TOTAL</u>
<u>1969</u>			
1. General Director's Office	45,5	-	45,5
2. Maritime Division	492,8	-	492,8
3. Inland Waters Division	163,2	-	163,2
4. Statistics Section	36,5	-	36,5
Total	<u>728,0</u>		<u>728,0</u>
<u>1970</u>			
1. General Director's Office	47,9	- <u>1/</u>	47,9
2. Maritime Division	338,3	129,6	467,9
3. Inland Waters Division	124,2	24,1	148,3
4. Statistics Section	32,7	6,3	39,0
Total	<u>543,1</u>	<u>160,0</u>	<u>703,1</u>
<u>1971</u>			
1. General Director's Office	47,2	-	47,2
2. Maritime Division	292,2	259,7 <u>2/</u>	452,9
3. Inland Waters Division	37,0	98,6	135,6
4. Statistics Section	34,0	-	34,0
Total	<u>320,4</u>	<u>349,3</u>	<u>669,7</u>
<u>1972</u>			
1. General Director's Office	69,5	-	69,5
2. Maritime Division	164,1	202,5	373,6
3. Inland Waters Division	151,9	34,2	236,1
4. Statistics Section	17,1	22,4	39,5
Total	<u>402,6</u>	<u>316,1</u>	<u>718,7</u>
<u>1973</u>			
1. General Director's Office	63,1	-	63,1
2. Maritime Division	42,9	173,1	216,0
3. Inland Waters Division	1,5	167,6	169,1
4. Statistics Section	34,1	-	34,1
Total	<u>141,6</u>	<u>360,7</u>	<u>502,3</u>
<u>1974</u>			
1. General Director's Office	76,3	- <u>3/</u>	76,3
2. Maritime Division	205,8	-	205,8
3. Inland Waters Division	241,9	-	241,9
4. Statistics Section	N.A.	-	N.A.
Total	<u>524,0</u>	<u>-</u>	<u>524,0</u>

1/ - 2/ Counterpart Funds generated from AID/Program Loan

3/ - Does not include \$4,035,325 pesos Sector Loan 514-L-067 released to INDERENA on December 1974, but not spent in 1974.

Source: Min. Agr. Budget Unit.

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and handling of fish products and developed legislation governing methods and equipment for fishing which has been approved by the Colombian Congress.

The proposed loan will assist INDERENA in evolving still another stage of its natural resources development efforts by providing badly needed research facilities in the lower and middle altitudes and training for personnel in the areas of applied research. With the strengthening of INDERENA envisioned within this loan, it will have an improved capacity to convert the basic understanding of natural resources gained over time into programs of national and economic exploitation of these resources for improvement of incomes and well-being of the Colombian population.

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## II. PROJECT DESCRIPTION

The proposed loan for support of aquaculture and fisheries management research is one of a series of actions the overall goal of which may be paraphrased from the GOC's National Food and Nutrition Plan as follows: to achieve the progressive nutritional well-being of the population -- particularly of those segments with the fewest resources -- by satisfying its basic dietary necessities with respect to quantity and quality. This project will contribute to one specific aspect of the general goal, that is, increased availability and consumption of low-cost protein, by supporting research directed at developing techniques for increased fish production. Specifically, the purpose of the proposed project is: 1) to develop economically and technically sound aquaculture systems suitable primarily, but not exclusively, for small farmer use; and 2) to produce a package of management recommendations, appropriate for use by artisan fishermen, designed to rationalize exploitation of the fish population of the lower Magdalena River.

The inputs that the proposed loan will provide to accomplish these two objectives which constitute the goal of the project are: 1) funds to assist in development of research facilities; 2) funds to train the professional staff of those facilities; and 3) technical assistance.

It should be emphasized that although considerable attention has been given to involving low-income groups such as small farmers and artisan fishermen in the project by directing the research toward producing technical packages suitable for their use, the basic goal of the project is not to increase small farmer incomes but rather to improve Colombia nutritional standards by developing a technology for increasing the production of an inexpensive form of protein. The principal benefit of the project, therefore, will be the increased supply of low-cost protein. An important auxiliary benefit, however, will be the eventual increase in the incomes of small farmers and artisan fishermen along the Magdalena which will follow adoption of the technical packages to be developed by this loan.

Successful completion of research and development of the desired technical packages, of course, are necessary but not sufficient steps to achieve the goal or even to achieve the sub-goal, i.e., increased fish production. Nonetheless, they constitute the pre-condition for future actions. Additional steps which will be necessary, such as getting the technical packages to the groups for whom they have been designed and providing credit to facilitate their adoption, have been discussed in the section above, "Nature of the Project."

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The specific activities to be supported under the proposed loan are:

A. Development of Research and Demonstration Facilities

1. Repelón Fishculture Station

a. Construction and Equipment

The GOC has given first priority to developing aquaculture in warm water areas since it has been determined that those areas have the greatest aquaculture potential. The North Coast of Colombia, in particular, shows considerable promise for aquaculture development since it is an area of many small farmers and abundant water resources. Aquaculture, in constructed or existing farm ponds and in existing "ox-bow" type lakes would complement the agricultural activity of the region by utilizing land which is not suitable for agriculture and by rotating fish growing with crops. The North Coast possesses the additional advantage of markets in Cartagena and Barranquilla as well as proximity to the large market in Medellin.

Present fishculture facilities on the North Coast are inadequate. The small station at San Cristobal has only six small concrete tanks, no land for expansion, and no electricity. For these reasons, Repelón, near San Cristobal, was selected as the site of a new fishculture station. The first phase of construction at Repelón (installation of 2.7 hectares of earthen ponds and construction of handling house) is currently under way with financing from Sector Loan 514-L-067. Auburn University, under USAID grant financing, did the basic designs and approved engineering plans drawn up by INDERENA's engineering staff for the entire station. From these plans, the construction costs were calculated.

The proposed loan will finance installation of an additional 8 hectares of earthen ponds as well as construction and equipment of the laboratory, fingerling house, and staff housing. Construction costs are estimated at US\$406,588 of which the GOC will provide US\$247,612 (60.9%) and the loan, US\$ 158,967 (39.1%). The equipment, valued at US\$157,437, will be entirely loan financed.

b. The Research Program

INDERENA has completed, with AID assistance, basic biological research on a number of species native to the region. Two of these, bocachico and mullet, have considerable promise in the short run. Bocachico accounts for nearly 70 percent of inland catch and is thus well known to Colombian consumers. INDERENA has developed the technique for inducing artificial spawning of bocachico, thereby accomplishing an important prerequisite for culture of this species.

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Lisa (mullet), a salt water fish which adapts well to fresh-water aquaculture, is a promising seasonal species due to the fact that artificial spawning is not necessary. At two times during the year, January-March and September Lisa fingerlings abound off the North Coast. INDERENA has been tapping this natural resource by capturing Lisa fingerlings and releasing them in some of the coastal marshes.

The research program at the Repelón Station will begin in late 1975, when the first 2.7 hectares of ponds are completed. First priority will be given to research on bocachico and Lisa species. The work will consist of experiments designed to determine the optimum stocking rate per cubic meter of water, optimum level of fertilization of ponds and some limited feeding trials. INDERENA will conduct an economic and technical evaluation of the results of these experiments in order to provide the information for some on-farm trials in both existing cattle watering ponds and constructed ponds in the region. The purpose of the on-farm trials will be to test the production results obtained at the research station and to provide additional information regarding economics of size, feeding, etc. INDERENA's evaluation of these results will provide the basis for a broad-scale extension program among the small farmers of the region. Based on the Brazilian experience, it is anticipated that the technical package can be developed by 1978 and that farmers will be using it by 1979.

While the primary emphasis of the research program will be to develop a technical package for small farmers, work will also be carried out on fish diseases, fish nutrition and induced spawning of other native species of the region. This work will provide complementary as well as additional information which will aid the extension program in the long run.

A time-phased research implementation plan for Repelón will be presented to AID for approval on an annual basis. Since the objective of AID's assistance to the station at Repelón is primarily to support the development of a package of aquaculture practices suitable for small farmers, the research plan will be evaluated in terms of how well it is oriented toward that objective. There are three general approaches to achieve that objective. One approach would be to direct research efforts toward the minimum economic pond size, at the same time insuring that any inputs used are within the reach of the target small farmer and that the management practices required are relatively simple. A second approach would be to analyze the existing small farmer conditions in the area of influence and adapt the research to those conditions. A third alternative would be some combination of the two approaches. USAID and the GOC feel that the combined approach has a higher probability of leading to a technical package which will be suitable for small farmers. In reviewing the annual research plan USAID will require that work be done on analyzing the prevailing small farmer conditions, minimizing the management requirements, utilizing species that feed low on the food chain, concentrating on minimum economic pond size and using inputs that are readily available and within the reach of the target small farmer.

Local costs associated with the research program at Repelón are estimated at US\$ 287,082 , of which the GOC will finance US\$ 174,833 (60.9%) and the loan, US\$ 112,249 (39.1%).

## 2. Magangué Fishery Management Improvement Center

### a. Construction and Equipment

As noted in the background section above (Tables 1.1 and 1.2), approximately 40 percent of Colombia's total marine and fresh water fish catch comes from the Magdalena River. Magangué, located about 200 miles south of the north coast where the Cauca River empties into the Magdalena, is the single most important fishing area, not only along the tremendously rich Magdalena, but also in the entire country. Thus, whatever improvements can be made in current management practices will have their greatest impact in this area.

Funds from the proposed loan will be used to construct a headquarters building and small laboratory facility and to purchase equipment for the Magangué Fishery Management Improvement Center. Estimated construction costs have been calculated on the basis of usual per-unit costs in the Magangué area and amount to US\$19,654 , of which the GOC will provide US\$ 11,969 (60.9%) and the loan, US\$ 7,685 (39.1%). The necessary equipment valued at US\$110,599 will be entirely loan financed.

### b. The Inland Fisheries Research Program

The Magdalena River basin fisheries are unique because of the "boom and bust" cycle which is created by alternating wet and dry seasons. During the wet season, when many of the river fish spawn, the mud flats and many "ox-bow" lakes adjacent or connected to the river are flooded. Plentiful food from decaying vegetation assures good survival and rapid growth of the fingerlings recruited into these waters. Subsequent drying up of these waters reduces the area available for the grown fish and results in a high catch per unit of effort.

During the dry season, only the more desirable species are harvested (bagre, bocachico, and corvina); other species have no market value at this time and are returned to the water. During the high water period, all species have market value, but little fishing occurs. Fishing techniques are rudimentary, primarily hand seouring and cast netting. During the wet season, however, these techniques are not very effective. Introduction of new techniques would undoubtedly increase catches.

During the dry season, the average daily catch is probably about 40 fish, but might range as high as 100. The fishermen receive 2-4 pesos per fish, which later sell for 12-24 pesos in Bogota's market. Substantial fixed costs -- ice, packing, and transportation and high losses -- account for a sizeable portion of the mark-up.

Management recommendations to insure persistence of the fishery and to improve its exploitation cannot be made without a better understanding of the dynamics of the fish stocks and of the socio-economic factors affecting the fishermen. As a result, the research program initially must be broadly based, to develop a general understanding of the dynamics of the fish stocks, of the economics of harvesting and marketing, and of other socio-economic factors influencing the fishery. Assessments of fluctuations in quantity, size, and species composition of the catches will be compared for different areas and rates of exploitation. Conservation and management recommendations will be developed from such data.

The Magangué Fishery Management Improvement Center will submit its research plan to USAID annually for approval. USAID will generally determine that the kinds of experiments to be conducted will produce the kinds of data necessary to formulate recommendations rationalizing exploitation of the river system's fish resources. For example, USAID will verify that efforts to gather information on population dynamics, sizes of catches, etc. are oriented towards determining whether or not exploitation may be increased without over-fishing the river. In addition, USAID will require that experiments concerned with fishing techniques are conducted with gear within the technical and financial grasp of the artisan fishermen for whom the package of improved management techniques is to be designed.

Local costs associated with the Magangué research program are estimated at US\$ 140,979, of which the GOC will provide US\$ 85,850 (60.9%) and the loan, US\$55,123 (39.1%).

### 3. Eastern Plains (Llanos) Fishculture Station

#### a. Construction and Equipment

Funds from the proposed loan will be used to construct and equip a full-scale fishculture station in the Llanos similar to, but somewhat smaller than the Repelón Station. The engineering designs will be completed by INDEFENA and approved by an independent contractor. Estimates for construction costs have been based upon costs of the Repelón Station. Since the site has not yet been selected, construction will not begin until the second year of the loan. Construction costs are estimated at US\$278,824, of which the GOC will provide US\$169,804 (60.9%) and the loan US\$109,020 (39.1%). The necessary equipment, valued at US\$164,922, will be completely loan financed.

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b. The Research Program

The areas of influence of the Llanos Station will be primarily the Orinoco River basin and, to a lesser degree, the Amazon basin. The fish in these river systems are different from those found in other systems such as the Magdalena River, and almost no biological research has been done on them. Applied biological studies will begin immediately following signing of the proposed loan to select the most promising species. Following completion of the station, the first step in the research program will be to induce artificial spawning in the species identified. Then, a program similar to that described under for the Repelón Station will be carried out in order to develop a technical package for aquaculture. It is not anticipated, however, that this package will be available until FY 1980.

In conducting its annual review of the research plan for the Llanos fishculture station, USAID will determine whether or not the experiments being planned are likely to lead to identification of the minimum economic pond size. USAID will also require that the inputs being used in the experiments are readily available. The bulk in which the inputs must be purchased will be a less important factor in the Llanos than in the area of influence of the Repelón or Upper Magdalena stations. The reason for this is that land is relatively abundant and farm sizes larger in the Llanos than in the North Coast or Upper Magdalena areas. Thus, it is anticipated that the average aquaculture pond size in the Llanos may well be larger, too.

The Mission will still require that experiments be focused, to the extent possible, on fish which feed relatively low on the food chain. Management considerations are less important here -- because of the low concentration of small farmers in the Llanos -- than is the fact that such fish provide the best hope for an aquaculture system which will produce a cheap source of protein for wide consumption.

The local costs associated with the Llanos research program are estimated at US\$206,132, of which the GOC will provide US\$125,535 (60.9%) and the loan, US\$80,597 (39.1%).

4. Upper Magdalena Fishculture Station

a. Construction and Equipment

GOC concern with applied aquaculture in medium climate zones (between 1000 and 2000 meters above sea level) stems from the fact that such areas have high concentrations of population and small farms. Some research facilities owned by the University of Caldas and the Regional Development Corporation for the Cauca Valley (CVC) already exist in this climatic zone, but are small and not adequate for the task of conducting the necessary multi-species research.

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Funds from the proposed loan will be used to construct and equip a station consisting of a laboratory, hatchery, handling house, staff quarters, and earthen ponds on a site which will be selected by the end of the first half of FY 1976. Engineering plans will be prepared by INDERENA and approved by an independent contractor. Cost estimates for this station have been based on the costs of the Repalón Station to which it will be very similar. Construction costs are estimated at US\$153,529, of which the GOC will provide US\$93,499 (60.9%) and the loan, US\$60,930 (39.1%). The necessary equipment, valued at US\$81,772, will be entirely loan financed.

b. The Research Program

The University of Caldas and the CVC are working on an aquaculture system for the exotic species, Tilapia. The University has an extension program with the Coffee Growers' Federation which reaches approximately 450 small farmers who produce the fish primarily for home consumption. The CVC has a similar extension program reaching about 250 small farmers and, in addition, carries out research on native species when fingerlings can be captured.

A major problem with Tilapia has been its tendency to overpopulate small farm ponds, thus reducing the average size of adults. Since the species was first brought to Colombia, however, research has been done in other countries on it. A hybrid strain has been developed which produces only male offspring, thus eliminating the problem of overpopulation. Auburn University has recommended that this hybrid be imported to Colombia since a package of management techniques for use by small farmers in medium altitude zones could quickly be developed for it.

The Upper Magdalena fishculture station will reproduce the hybrid Tilapia and conduct research to develop the technical package for small farmer use. Since this station is not scheduled for completion until the end of the first half of FY 1977, the extension package will not be available until FY 1980.

In view of the high concentration of small farmers in the area of influence of the Upper Magdalena station, USAID will use the same criteria for evaluating its annual research plan as it will use for evaluating the Repalón research plan.

The local costs associated with the Upper Magdalena research program are estimated at US\$ 80,483, of which the GOC will finance US\$49,014 (60.9%) and the loan, US\$31,469 (39.1%).

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B. Equipment

We have already mentioned that loan funds totalling US\$514,800 will be used to purchase equipment necessary for the functioning of the research facilities at Repelón and Magangué and in the Llanos and Upper Magdalena area. Four major categories of equipment will be required: laboratory equipment US\$160,166, fishing equipment US\$108,384, vehicles US\$133,750, and miscellaneous US\$112,500. Annex II, Exhibit I, contains a list of the items required and their estimated costs. Although this list has been carefully prepared by INDERENA and exhaustively reviewed by USAID, it will be examined again and revised, if necessary, before invitation for bids are issued.

C. Contracts

Loan funds will be used to finance a number of contracts between INDERENA and various universities, regional development corporations, and other public and private entities engaged in inland fisheries development. USAID will review the contracts to ensure that the studies and other tasks to be undertaken do not duplicate work already underway. The costs for these contracts are estimated at US\$189,404, of which the GOC will finance US\$115,347 (60.9%) and the loan, US\$74,057 (39.1%).

The objective of the contracts with the University of Caldas and the Cauca Valley Corporation will be to conduct a thorough analysis of their existing small aquaculture extension programs and of the economic return to the small farmers who are implementing their recommendations. The nature and causes of deviations from the recommended practices will also be investigated in order to determine factors inhibiting small farmer receptivity to aquaculture. Results from these studies will provide important benefits to aquaculture research being conducted at stations at Repelón, along the Upper Magdalena, and in the Llanos.

The University of Cordoba will be contracted to carry out research activities in fisheries nutrition concentrating on bocachico, lisa (mullet) niouro and capaz. It will also carry out regional field trials based on promising results from the Repelón station. The University of Valle will be contracted to work in fisheries biology as well as to conduct regional field trials based on findings of the CVC and the University of Caldas's research programs. The contract with INCORA will finance some on-farm trials along the Pacific Coast for small farmer production of Macrobrachium, a species of fresh water shrimp.

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D. Training

In a report prepared by AID consultants Bromley and Lin on the Brazilian aquaculture and fisheries project, the need for well trained personnel, particularly in general aquaculture and extension, is stressed. The GOC and the Mission agree that adequately trained personnel is absolutely essential to the accomplishment of the project goals. Once the physical infrastructure is completed the limiting factor will be trained personnel. INDERENA currently has about 45 biologists, primarily trained in Colombia at the B.S. level. There are no Colombian universities offering training beyond the B.S. and the current curriculum does not include courses in aquaculture. Most of those who have M.S. degrees have specialized in marine biology. INDERENA has only one trained aquaculturalist. There are a few others in the country, but they are employed in the private sector. Training is viewed as the key to the long run success of the fish development program. Both in-country and U.S. training will be funded.

The loan provides US\$334,800 for long term academic training in the U.S., primarily at the Masters level, in general aquaculture, fish nutrition, fish diseases, fishery economics and marketing, fish extension and lake management. Approximately 17 people will be trained at this level under the loan, including personnel from INDERENA as well as from Universities and other agencies working in this area. Approximately US\$15,200 will also be provided for 12 man months of special short courses in such fields as fish nutrition and production.

Secondly, an in-country training program will be established through a loan funded contract, probably with a U.S. University. The contract will provide for two or three of the contract personnel, each in a different area of specialization, to visit Colombia two or three times a year, for several weeks each. During each of these visits two types of work will be done. First, a review of research results with the Contractor's assistance in their interpretation and a review with constructive criticism of the designs of future research programs. Secondly, a formal short-course will be given by the Contract personnel for INDERENA technicians, university personnel and other private organizations. These may take place on the stations or be centrally located in order to facilitate transportation. The detailed programs of training will be worked jointly by INDERENA and the Contractor, prior to negotiating the contract (See Annex II, Exhibit 5 for cost estimate of Training component). The total cost of the in-country training program is US\$60,000.

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E. Technical Assistance

Due to the current lack of trained personnel in INDERENA in several technical areas, the Mission and the GOC consider that technical assistance for the proposed project is essential. At the time of writing the IRR the Mission felt that the FAO Continental Fishery Project COL/52 would provide all required technical assistance. At this time the FAO project is under review by the UNDP. Discussion with the evaluation team left considerable doubt regarding the continuation and content of any future assistance. More specifically, the evaluation team made it clear to the Mission personnel that they did not want to be involved in advising INDERENA in overall fish station management. They stated that if the project continued FAO experts would be involved only in specific research projects in the various stations. The Mission feels that overall management of these stations will require technical assistance since INDERENA has no previous experience in this area. The future of the FAO project will likely not be clear until June, 1975. Both the Mission and the GOC feel that funds under the proposed loan should be reserved for technical assistance to be used only if adequate assistance is not available from other sources.

It is estimated that three full-time technicians for a total of 90 man-months plus approximately 20 man-months of short-term consultants will be required. The three long-term technicians will be specialists in the following areas;

- 1) aquaculture development with experience in fish farm management;
- 2) general aquaculturalists with experience in research station management and;
- 3) a lake and river management expert.

Short-term consultants will be needed in the areas of station design, research design, fish diseases, fish nutrition, and hatchery operation. The precise job descriptions will be finalized with INDERENA once the FAO project becomes clearly defined. The Mission feels that the most likely source for such technical assistance would be a U.S. university. The loan will provide US\$580,000 for such assistance. The cost estimates presented in Annex II, Exhibit 6 are reasonable and based on previous experience with institutional contracts.

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### III. INSTITUTIONAL ASPECTS

#### A. INDERENA

Prior to 1969, the responsibility for the conservation and rational exploitation of natural resources in Colombia fell on the regional development corporations. Their efforts were coordinated by the Ministry of Agriculture. The Natural Resources Institute (INDERENA) was created in September 1968 and began operations in January 1969. INDERENA is formally charged with the administration, conservation and development of inland and marine fisheries, national parks, national forests, watersheds and wildlife. INDERENA has jurisdiction throughout the entire country, except for a few small areas that are administered by specialized regional development agencies such as the Cauca Valley Corporation (CVC) and the Sinu Valley Corporation (CVS). The total staff numbers approximately 2,300, fourth-fifths of whom are located in field stations. INDERENA has divided Colombia into six large administrative regions: Central (administrative center, Bogota), Southwest (Popayan), Pacific (Buenaventura), West (Medelín), Atlantic Coast (Barranquilla), and East (Bucaramanga). Each region is subsequently divided into administrative sections.

Since its creation in 1968 INDERENA has had considerable difficulty in defining its role. It is charged with the protection of fisheries, timber, and wildlife resources at the same time that it has responsibilities for encouraging the rational exploitation of these resources. Given these responsibilities and the very limited knowledge currently available concerning Colombia's renewable natural resources, INDERENA has tended to follow a conservative policy of emphasizing basic research and has done little to promote commercial exploitation of fish or forestry resources.

Recently, however, INDERENA has shown considerable interest in becoming more commercially oriented. More specifically, INDERENA has completed forest inventories on a substantial portion of Colombia's reserves, a prerequisite to the rational exploitation of this resource. INDERENA submitted and the Colombian Congress approved legislation which simplifies the sale of concessions to lumber companies. INDERENA, in cooperation with the Dutch Government recently began work on a watershed management project that is designed to more efficiently utilize the water resources of the Magdalena River basin. In addition, the proposed loan would support INDERENA's efforts to

rationally utilize renewable natural resources by financing research projects in the area of fisheries development where the objective is to bring them to the commercial stage as quickly as possible.

INDERENA's activities are classified into programs, sub-programs, and projects. Programs include Fisheries, Forestry, River Basin Management, Engineering and Water Use, National Parks, Social Development and Inspections, Statistics, and Communications. Sub-programs of the Fisheries program include Inland Fisheries, Marine Fisheries, Research and Technology, Fish Exploitation and Statistics. Table III-1 shows INDERENA's organizational chart and Table III-2 shows the organizational chart of the Fisheries Unit.

#### B. INDERENA - Fisheries Unit

The Fisheries Unit of INDERENA has 45 professionals, primarily biologists and administrative personnel. The Inland Fisheries Division, which will be responsible for the project has 24 professionals at the present time. Most of INDERENA's past efforts in fisheries has been directed toward basic research and marine fisheries.

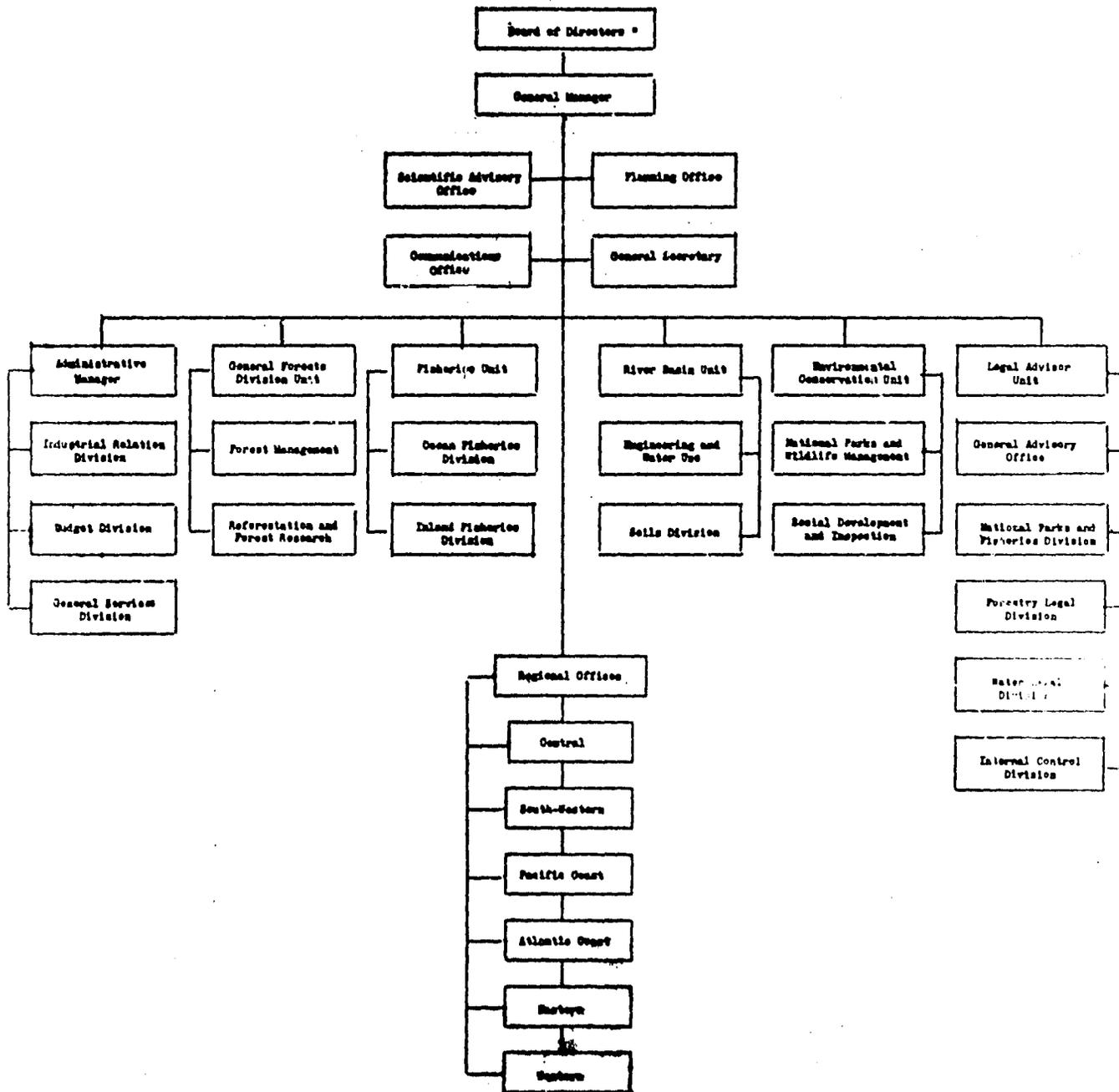
Under an INDERENA/FAO project, a survey of marine resources was completed in 1972. This survey demonstrated that the marine fishery holds only limited potential for increased future production. As a result, both INDERENA and FAO have turned their attention and resources to inland fisheries in Colombia.

INDERENA's efforts in inland fisheries has been plagued by a lack of trained personnel and a lack of adequate research facilities. Most of INDERENA's professional fisheries staff have been trained to the B. S. level in Colombian universities. There are no universities in Colombia which offer graduate level training in biology. Although INDERENA has several marine biologists trained at the M. S. level, they have only one trained aquaculturalist. The FAO project provides funds only for short-term training.

The loan proposes to finance M. A. level training for 17 professionals, all but a few of which are on INDERENA's staff. In addition, the technical assistance contract personnel will conduct short-term specialty courses within the country to strengthen the capacity of existing personnel. The loan will also provide for short-term third-country training for approximately three staff members. Most of the

TABLE III-1

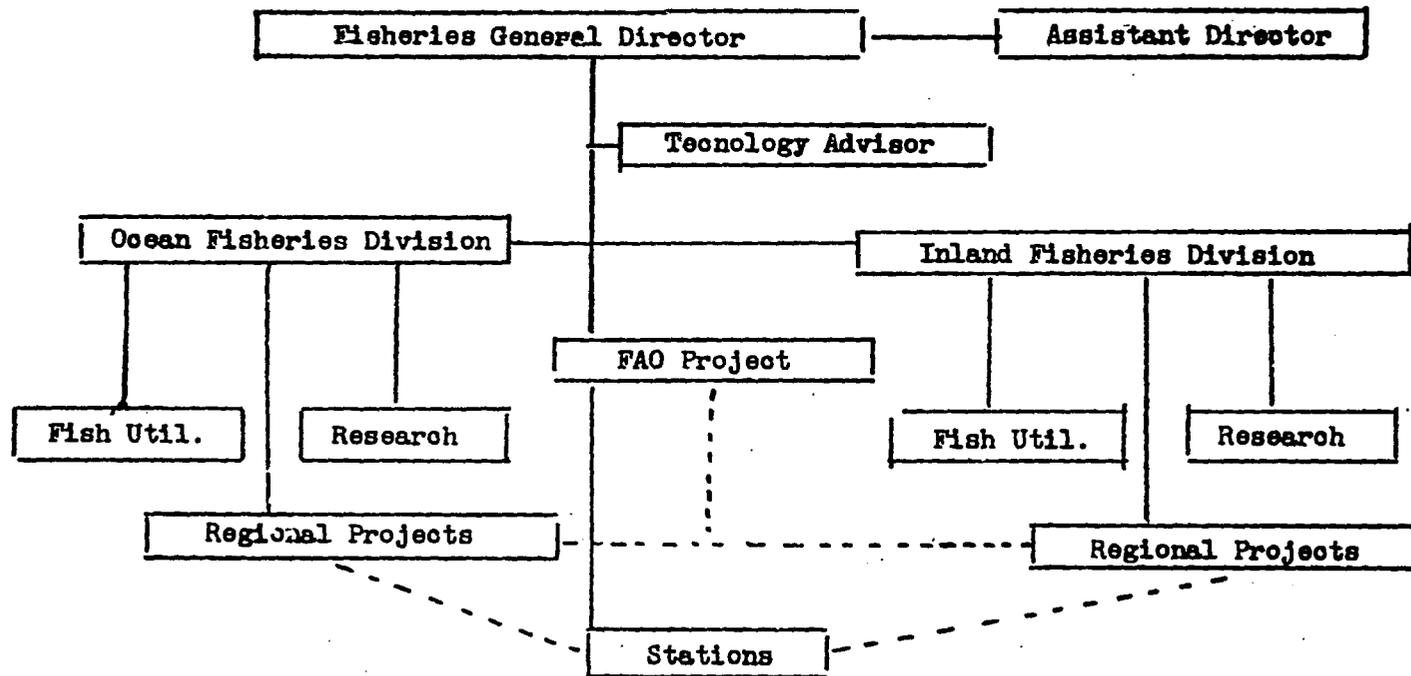
I N D E R E N A



1/ Consists of representatives of Minister of Agriculture, Agricultural Rural Bank, Institute of Agrarian Reform, Agricultural and Livestock Marketing Institute, Agricultural and Livestock Institute, Assoc. of Owners, one additional person appointed by the President.

TABLE III-2

F I S H E R I E S   U N I T



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requirements for short-term training will be met under the FAO project.

Due to the lack of adequate field research facilities, INDERENA also lacks personnel with experience in managing experimental research/demonstration stations.

The proposed technical assistance contract will provide personnel experienced in the management and operation of research stations. INDERENA will make counterpart personnel available to work with those technicians. Relevant in-country training programs will also be financed by the loan.

Over the course of the project, the INDERENA/Fisheries Unit proposes raising its expenditures for personnel services by a factor of 2.5. The reasons for this large increase are: to hire additional staff for the operation of the new research stations; to increase salary levels, bringing them into line with salaries in similar GOC agencies; and, very importantly, to provide incentive payments to staff members with graduate degrees (up to 25 percent for M. A., up to 50 percent for Ph. D.) as a means of retaining INDERENA's trained personnel. The availability of research/demonstration facilities will also be a factor in retaining those personnel.

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#### IV FINANCIAL ASPECTS

##### A. The Borrower

The Borrower will be the Government of Colombia represented by the Minister of Finance, the Minister of Agriculture and the Director of the National Planning Department. The terms proposed for this loan activity are concessional: 40 years amortization of principal, including a 10 year grace period; the interest rate will be two percent per annum during the grace period and three percent per annum thereafter.

The prospects for repayment of the proposed loan are excellent. The Government of Colombia will undertake to repay the obligation from its general budgetary resource. Colombia's debt service burden is low compared to other Latin American countries experiencing similar economic conditions. For a discussion of the GOC's economic and fiscal performance see Bogotá 631 (Jan.1975) and Bogotá A-14 (February 1975).

##### B. The Implementing Agency

The Implementing Agency will be the Natural Resources Institute (INDERENA), an autonomous government agency attached to the Ministry of Agriculture.

INDERENA is heavily dependent on GOC budgetary allocations for its program activities and must fully justify expenditure proposals to the Ministry of Agriculture. Close contact with the Ministry of Agriculture is maintained through the Minister's special advisor on natural resources, and with DNP through the Agrarian Studies Section.

Table No. IV-1 shows INDERENA's expenditures during the period 1969-1974. It will be noted that Fish Activities as a share of the total expenditures has declined from about 20 percent in 1969 to a little over 8 percent in 1974. At the start of that period, INDERENA (and FAO) was emphasizing offshore fisheries activities. Subsequently, based on FAO findings, the limited potential of offshore fishing was recognized and the funding for those activities declined. The shift in focus from offshore to inland fisheries is recent and will be reflected in the increased share of INDERENA's 1975-76 budget that Fish Activities will receive.

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TABLE IV-1.- INDERENA PROGRAM EXPENDITURES 1969-1974

	( US\$ 000 )					
	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Forestry Activities	1,087,8	1,755,1	1,975,1	2,074,6	1,926,9	1,812,5
Fish Activities	728,0	703,1	669,7	718,7	502,3	524,0
Soil Water Activities	190,4	536,1	663,5	1,025,8	1,038,3	1,324,9
Park and Wildlife	160,8	455,7	776,5	485,9	389,9	393,2
Control and Supervision	430,8	600,4	727,5	717,3	646,1	777,8
Other activities	<u>1,026,8</u>	<u>1,233,7</u>	<u>1,322,7</u>	<u>1,373,7</u>	<u>1,318,1</u>	<u>1,580,3</u>
TOTAL	<u>3,624,6</u>	<u>5,284,1</u>	<u>6,135,0</u>	<u>6,396,0</u>	<u>5,821,6</u>	<u>6,412,7</u>

Source: Ministry of Agriculture, Budget Office.

As regards INDERENA's other program activities, Forestry has accounted for over 30 percent of expenditures, reflecting the GOC emphasis on this particular resource. Soil and water activities have claimed a steadily increasing share of the budget from about 5 percent in 1969 to over 20 percent in 1974. This reflects INDERENA's support of the Middle Magdalena Water Resource Utilization project (in cooperation with the Dutch Government). Parks and Wildlife activities increased from about 4 percent in 1969 to over 12 percent in 1971 and subsequently declined to about 6 percent in 1974.

Table IV-2 presents INDERENA budgetary figures for 1975 and the estimated budget for 1976.

TABLE IV-2.- INDERENA: 1975 BUDGET, 1976 PROJECTIONS

	( US\$ 000 )		
	<u>1975</u>	<u>1976</u>	<u>Percentage Increase</u>
Forestry Activities	1,923	2,412	25
Fish Activities	1,057	1,940	84
Soil & Water Activities	1,335	1,454	1
Park and Wildlife	564	697	24
Control and Supervision	982	1,296	32
Other Activities	<u>1,973</u>	<u>2,151</u>	9
TOTAL	7,834	9,940	27

Source: Min.Agr. Budget Office.

Note: Exchange rate used is 32:1 for 1975 and 34:1 for 1976.

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Table IV-2 shows that the GOC has planned to increase the share of INDERENA's budget for fisheries from 13 percent in 1975 to 20 percent in 1976. In absolute terms, the planned increases are also substantial: from US\$524,000 in 1974 to just over one million in 1975, to nearly two million in 1976. It should be pointed out, however, that the 1975 and 1976 figures are based on a budget that is rarely executed in its entirety. Past experience has shown that actual expenditures of most agencies of the Government amount to approximately 85 percent of the approved budget figures. Even assuming this pattern persists, however, it would still amount to substantial increases in INDERENA's program for 1975 and 1976.

C. Financial Plan

1. Funding Requirements

The total costs of the proposed project are summarized in the following table:

TABLE IV-3.- PROJECT COSTS SUMMARY

( US\$ 000 )

<u>Activity</u>	<u>U.S.</u>	<u>GOC</u>	<u>TOTAL</u>
Equipment Purchases	515	-	515
Technical Assistance	580	-	580
Training	410	-	410
Operational Expenditures	<u>695</u>	<u>1,083</u>	<u>1,780</u>
	2,200	1,083	3,283

The total project cost is \$3,283,000, of which AID is proposing to finance \$2,000,000, or 67% of the total. The GOC will provide \$1,083,000 (33%) through annual INDERENA budget allocations to cover administrative costs and operational expenditures directly related to the program.

2. Sources of Funding

The following tables indicates the proposed source and scheduling of funds:

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TABLE IV-4 - PROJECT SUMMARY BY SOURCE OF FINANCING

( 000 of dollars )

	<u>1975</u> (July-Dec)	<u>1976</u>	<u>1977</u>	<u>1978</u> (Jan-June)	<u>Total</u>	<u>Percentage</u>
<u>LOCAL COSTS</u>						
GOC Funds	220.0	409.4	342.0	111.2	1082.6	60.9
AID Loan Funds	141.3	262.9	219.7	71.3	695.2	39.1
Total	361.3	672.3	561.7	182.5	1777.8	100.
<u>PROJECT COSTS (Excluding Training &amp; Technical Assistance)</u>						
AID Loan Funds						
Local Costs	141.3	262.9	219.7	71.3	695.2	
Equipment	268.0	246.8	--	--	514.8	
Sub-Total AID Loan	409.3	509.7	219.7	71.3	1210.0	53
GOC Local Costs	220.0	409.4	342.0	111.2	1082.6	47
Sub-Total Project	629.3	919.1	561.7	182.5	2292.6	100
<u>TOTAL PROJECT SUMMARY</u>						
AID Loan Funds						
Local Costs	141.3	262.9	219.7	71.3	695.2	
Equipment	268.0	246.8	--	--	514.8	
Training & Tech. Assist.	990.0	--	--	--	990.0	
Total AID Loan	1399.3	509.7	219.7	71.3	2200.0	67
Total GOC Funds	220.0	409.4	342.0	111.2	1082.6	33
TOTAL PROJECT	1619.3	919.1	561.7	182.5	3282.6	100

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TABLE IV-5 PROJECT SUMMARY - SCHEDULING OF FUNDS

	( P E S O S )					( D O L L A R S )				
	1975	1976	1977	1978	Total	32-1 1975	34-1 1976	36-1 1977	38-1 1978	Total
<u>Local Cost Financing</u>										
Personnel Services	1,023,400	4,324,074	7,102,084	3,978,417	16,427,975	31,981	129,237	197,280	104,695	463,193
Maintenance & Insurance	--	800,000	1,700,000	1,080,000	3,580,000	--	23,529	47,222	28,421	99,172
Contracts	1,035,000	2,970,000	1,870,000	675,000	6,550,000	32,344	87,353	51,944	17,753	189,404
Travel & Per Diem	60,000	300,000	350,000	190,000	900,000	1,875	8,824	9,722	5,000	25,421
Communications	5,500	16,300	22,400	12,600	56,800	172	479	622	332	1,605
Public Services	8,000	12,500	20,000	11,000	57,500	260	544	556	290	1,640
Supplier & Materials	250,000	960,000	1,400,000	900,000	3,500,000	7,213	27,941	36,889	23,684	95,327
Publications	10,000	70,000	195,000	90,000	365,000	312	2,059	5,417	2,366	10,157
Purchase of Land	150,000	800,000	--	--	950,000	4,667	23,529	--	--	28,216
Constructions	9,020,000	12,540,000	7,560,000	--	29,120,000	221,275	368,624	210,000	--	860,699
SUB-TOTAL	11,561,900	22,858,874	20,219,484	6,937,017	61,577,275	361,310	672,319	561,652	182,553	1,777,834
<u>Dollar Cost Financing</u>										
Equipment Purchase	---	---	---	---	---	268,036	246,764	---	---	514,800
Participant Training	---	---	---	---	---	360,000	---	---	---	360,000
In-Country Training	---	---	---	---	---	60,000	---	---	---	60,000
Technical Assistance	---	---	---	---	---	580,000	---	---	---	580,000
SUB-TOTAL	---	---	---	---	---	1,258,036	246,764	---	---	1,504,800
GRAND-TOTAL	11,561,900	22,858,874	20,219,484	6,937,017	61,577,275	1,619,346	919,083	561,652	182,553	3,282,634

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D. Other International Donor Participation

During the past two and one-half years, FAO has been providing assistance to INDERENA for fish research and training. This assistance includes nine full and part-time technicians and approximately \$25,000 in equipment as part of the Continental Fishery Project (COL/52). The project has 23 Colombian counterpart personnel provided by INDERENA. The GOC has requested an expansion of the project for additional training and equipment and the project is currently under review by the UNDP. The magnitude and focus of future FAO assistance in inland fisheries is presently under discussion with the GOC. If the proposal set forth by the review team is implemented as planned, FAO will provide the in-country technical assistance required by the INDERENA Fisheries activities supported by AID.

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V. ECONOMIC AND SOCIAL ASPECTS

A. Performance of the Colombian Economy

The current performance of the Colombian economy represents a mixed picture. The growth rate over the past several years has been satisfactory exceeding 6 percent in each of the last four years. On the other hand, inflation has become a serious problem, with the rate of increase for 1973 and 1974 averaging 25 percent. The current government, which assumed power in August, 1974, has taken strong measures to slow the rate of inflation, and it is expected that inflation will gradually be reduced to more acceptable levels. The anti-inflation measures taken so far include a major tax reform aimed at improving the government's fiscal performance, elimination of some government subsidies, liberalization of imports, and a very tight monetary policy. This austerity is expected to have a negative impact on the growth rate, and some observers project a GNP growth below 3 percent for 1975. Nevertheless, given the inductive nature of this contraction and the fact that the economy appears to be generally sound, it appears likely that more rapid growth can be forthcoming by 1976, in an environment where inflation is much less serious.

The balance of payments picture for 1975 appears somewhat unfavorable, due mainly to a softening of demand for Colombia's major exports. Coffee prices have fallen substantially over the past six months, and prospects for the future seem unfavorable. At the same time, the recession in the industrial countries has led to a slowdown in exports of industrial products, with registrations for the first two months of 1975 trailing slightly the figures for the same period a year earlier. At the end of March, 1975, international reserves stood at US\$ 370 million or about three months imports.

By the end of the year, current projections are that reserves will be substantially below this level, and that the country may wish to seek a Stand-by Agreement with the International Monetary Fund. Nevertheless, this problem does not merit the term "crisis", and the expectation is that, through some reduction in the current high level of imports and an improvement in the external demand situation, prospects will again begin to improve for the balance of payments in 1975.

In general terms, then, the current performance and management of the Colombian economy indicate no problems with the effective utilization of the loan. The current austerity program reflects a serious effort to deal with the major problems of the economy, and reflects a high level of concern for good economic management. The balance of payments is currently in deficit, so that the effective transfer of the dollar resources made available under the loan seems assured.

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### B. Impact on the U.S. Economy

The activities under the proposed loan will not compete with U.S. enterprise, nor will they have any adverse effects on the U.S. economy. Although the proposed loan is directed at improving the exploitation of Colombia's inland water resources and the development of aquaculture, the anticipated increase in production of fish is intended for domestic consumption.

The proposed loan has a dollar financing component equal to 42 percent of the total project and 65 percent of the loan value. Nearly 26 percent of the proposed loan would be used to finance equipment purchased in AID Code 941 countries. An additional 19 percent of the loan value would finance technical assistance, most probably through a contract with a U.S. university. The remaining 21 percent of the dollar component would finance training, primarily in U.S. universities.

The proposed loan would increase Colombia's foreign exchange availabilities, leading to an increase in U.S. exports to Colombia. Since 1972, the U.S.'s share in Colombian imports has risen nearly 5 percentage points, to 43 percent of the total. Over the long run, the expected general impact of the program should provide a larger market for U.S. exports, assuming their continued price competitiveness.

### C. Benefits of the Project

Since the major thrust of the project is the development of economic aquaculture practices, the first group of beneficiaries will be those small farmers who adopt the technological package derived from the research. These farm families should benefit both from improved nutrition as a result of home consumption, and increased incomes from sales of fish as they expand the productive capacity of their ponds. As more of the production is marketed, consumers should also benefit from the impact of an increased supply of fish from this source.

The lake and river management improvement portion of this loan will provide direct benefits to the majority of the 200,000 artisan fishermen of Colombia. Since approximately 80 percent of the fish consumed in Colombia comes from inland water, the GOC estimates that the majority of the artisan fishermen are working inland waters. The fishermen will benefit from the use of improved fishing techniques designed to assure continuance, if not increases in production. These improved techniques will be developed as a result of research funded under this loan.

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In the future, consumers should benefit from both portions of the project. The distribution of consumer benefits by income group is difficult to estimate since this will depend on how much production can be increased, how much retail prices can be lowered, and the demand for fish by various income levels. Clearly, there is specific desire by both the GOC and AID to reach lower income consumers with fish protein at prices they can afford.

Estimating economic benefits from research projects, such as this one, is somewhat problematic. Economic returns to public research in agriculture have been calculated after the fact and are normally very high. In fact, it has been argued that the expected growth which can be purchased through research investments is several times as high as it is in other rural development projects.

Further a study of rice breeding in Japan adds to evidence that an underinvestment in research is typical. Quoting from this study:

" If underinvestment in agricultural research was the case for Japan, as well as from the United States, both characterized by a relatively well established agricultural experiment system, the potential benefit from the research for developing countries where the public research system is in an early stage should be extremely large. This inference is consistent with the findings of very high social returns from cotton research in Brazil and wheat research in Mexico. Public planners and policy makers should be constantly reminded about the tendency to underestimate the social productivity of research."

By far the most impressive result is the return to all past research on hybrid corn which is estimated to exceed 700 percent. The average return to poultry research in the U.S. has been estimated at 18 percent, with a marginal return (for additional units of research) of 50 percent. Other estimates of returns to research in U.S. agriculture have been estimated to range from 6.7 to 16.1 percent. In Colombia, returns to varietal research have been estimated at 76 to 96 percent for soybeans, 60 to 82 percent for rice, 11 to 12 percent for wheat and 0 percent for cotton. These estimates were based upon the yield advantage of the new varieties times the acreage planted to these improved varieties. In the case of wheat research, the yield advantage parameter was very high, but because of depressed local market conditions the acreage planted to new varieties was small. This resulted in a low overall return to research efforts to date. The zero return for cotton is due to the fact that the research program consisted of selecting among U.S. varieties to determine the best choice for Colombian conditions. It turned out that U.S. varieties all do equally well in Colombia; in retrospect, they could have been randomly selected and brought to the country.

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Attempting to estimate the returns to particular research in advance could theoretically be done with cost benefit analysis, but involves numerous assumptions, including the value of increased production that would be forthcoming, the time required for research findings to be derived, the rate of adoption by producers, and the market for the product, all of which are unknown at the moment. Secondly, there is the concern whether research should be treated by this methodology (a flow of benefits and costs) under any circumstances or whether it should be treated as an investment in a stock of knowledge that might have major benefits in the future. Cost/benefit analysis treats future benefits as discounted to the present day (i.e. \$1.00 of benefit 20 years in the future at a 10 percent rate of interest has a present value of \$0.15), while research activities in the future based on an established stock of knowledge may have a substantial impact at that point in time. This corresponds to the U.S. results on poultry research where the average return to research projects was estimated at 18 percent, but most recent research activities had a 50 percent return. In short, it would be difficult to estimate the value of the stock of knowledge about aquaculture which will exist in five or ten years.

However, by assuming the return per hectare of pond area from similar aquaculture activities in Brazil, one can make an approximation of the pond area requirements at a given point in the future, such that the discounted net returns to producers equals the discounted costs of the research, i.e., a break-even point where the cost/benefit ratio would be equal to one. This does not include potential benefits to consumers from lower protein prices or increased supply.

Five and ten years after the termination of the project, 1982 and 1987, were chosen as dates to calculate the pond area requirements to break-even, because it will take the duration of the project to finish installations, provide equipment, and develop the research needed to begin to extend aquaculture practices. It was further assumed that the rate of installation of ponds would be consistent with an S-shaped adoption curve that provides for 10 percent of the final acreage to be in place in 1978, 30 percent in 1979, 70 percent in 1980, 90 percent in 1981 and 100 percent in 1982 for the five year example.\*/ A similar model was used for the ten year example. An opportunity cost of 10 percent and, based Brazilian experience, US\$940 net return per hectare was used in these examples. This figure compares with net returns per hectare per year of US\$130 for mechanized corn, US\$200 for dryland rice, US\$250 for irrigated rice, US\$190 for dairy and US\$32 for beef in Colombia.

\*/  $DPV \text{ Costs} = \text{Benefits} = 940 X$

$$\frac{.1}{(1.1)^3} + \frac{.3}{(1.1)^4} + \frac{.7}{(1.1)^5} + \frac{.9}{(1.1)^6} + \frac{1}{(1.1)^7}$$

Value X is equal to the acreage in ponds

$$X = \frac{DPV \text{ Costs}}{940 \left( \frac{.1}{(1.1)^3} + \frac{.3}{(1.1)^4} + \frac{.7}{(1.1)^5} + \frac{.9}{(1.1)^6} + \frac{1}{(1.1)^7} \right)}$$

Cost estimates from the TDD of the loan through 1987 for both continued research and operation of the facilities as well as for the extension program were included in these calculations.

The results of the five year example were that by 1982, 1670 hectares of ponds would have to be producing fish to reach the break-even point (see Table IV-1 for the yearly estimates). In the ten year example, by 1987, 1713 hectares of ponds would have to be producing fish to reach a benefit/cost ratio of 1 to 1.

Table V-1. Number of Additional Hectares Producing Fish by Years to Reach the Break-even Point.

<u>To Reach Break-even Point in Five Years</u>		<u>To Reach Breakeven Point In Ten Years</u>	
	<u>Hectares</u>		<u>Hectares</u>
1978	167	1978	86
		1979	86
1979	334	1980	171
		1981	171
1980	668	1982	257
		1983	342
1981	334	1984	257
		1985	171
1982	167	1986	86
Total	<u>1,670</u>	1987	86
		Total	<u>1,713</u>

By the year 1982 the 1670 hectares would represent US\$1,569,800 of additional income in the rural sector. Both the GOC and the Mission believe, however, that the area devoted to these activities will, in fact, be considerably greater. Higher returns per hectare or greater area in ponds would, of course, result in a benefit/cost ratio greater than 1. In addition, at roughly two metric tons of fish per hectare, 1670 hectares of aquaculture would mean an additional 3,340 tons of fish per hectare, per year for consumers, or roughly a 7 percent increase in inland fisheries output over that recorded in 1972.

#### D. Environmental Aspects.

The implementing agency, INDERENA, is the government entity responsible for the conservation and exploitation of natural resources. Through its actions to date, it has exhibited concern for the environmental impact of the fisheries projects it has supported. For example, it has been working on introducing a variety of non-reproducing tilapia to farmers already engaged in fish farming, because the existing species of tilapia reproduce so rapidly that they threaten other species of fish when introduced into non-regulated waters. The project will assist INDERENA in

cultivating or adapting other species of fish which are compatible with the ecological mix of aquatic inhabitants in the various project zones. It will also enhance their capacity to suggest good lake and river management practices to fishermen. Furthermore, the Loan Agreement will contain a covenant regarding environmental activities.

#### E. The Role of Women

This project is not expected to have any noticeable impact on employment creation among Colombian women. Figures from the 1964 census show that 20.1 percent of the total labor force of 5,134,125 were women. The proportion of women engaged in agriculture, forestry, hunting, and fishing is much lower. Only 4.8 percent of the total (2,427,059) were women. 1/

The role of women in Colombia in agricultural production and related activities appears to be minor one, even though the actual number of women engaged in these activities is probably understated.

More specifically, the only known sociological study conducted in a small farmer area where an aquaculture extension program is being implemented suggests that women are not active in the management or exploitation of the aquaculture ponds. Only 3.2 percent of those persons fishing the ponds were mothers. The number of women other than mothers who fished was not calculated, but would probably be even smaller. 2/

However, some general propositions may be advanced to demonstrate the potential of the project's aquaculture component for achieving an indirect but positive impact on women:

1. To the extent that women are more concerned than men with the family diet and nutrition planning, they will more readily see the potential benefits of an aquaculture pond for improving family nutrition.

2. To the extent that extension programs are directed toward women, or at least include them, women's role in managing the aquaculture ponds will increase and their contribution to the family and national economies will be increased.

3. To the extent that aquaculture improves family diet, the health of all members of the family will be improved.

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1/ República de Colombia, Departamento Administrativo Nacional de Estadística, XXII Censo Nacional de Población, 1964, Resumen General, 1967, p.122.

2/ De Arango, Nury Cala, "Influencia de la Producción y Consumo de Tilapia *Malanopleura* en las Condiciones Nutricionales de Familias Minifundistas", thesis presented to Home Economics Department of the University of Caldas, 1971, p. 84.

F. Title IX - Building of Democratic Institutions

This project will have no direct effect in encouraging democratic private and local governmental institutions. However, to the extent that this project contributes to the Government of Colombia's goals of redirecting the distribution of income to low income groups and to improving nutrition, the confidence of these groups in the GOC's responsiveness to their needs and, hence, in the efficiency of democratic processes, will be strengthened.

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VI. LOAN ADMINISTRATION

A. Implementation Plan

<u>Action</u>	<u>Target Date</u>
1. Loan Authorization	May, 1975
2. USAID/GOC Loan Negotiations	June, 1975
3. Sign Loan Agreement and Issue Implementation Letter No. 1	July, 1975
4. Conditions Precedent to First Disbursement Met	August, 1975
5. First Disbursement	September, 1975
6. Construction Plans and Cost Estimates	
a. Magangue	November, 1975
b. Upper Magdalena	November, 1975
c. Eastern Plains	March, 1976
7. Annual Evaluation	July 1976, 1977 and 1978
8. Final Disbursement	July, 1978

B. Loan Monitoring

Primary responsibility for monitoring the loan implementation will rest with the USAID/Colombia Rural Development Division, assisted by the Project Development and Controller staffs, as well as OPSA and DNP. Disbursement requests, accompanied by detailed reports of program activities which shall serve as the basic management review tool will be submitted to USAID/Colombia through OPSA and DNP. Qualitative progress will be reviewed through periodic field inspections.

C. Disbursement Procedures

1. Peso Disbursements

Following satisfaction of Conditions Precedent and upon receipt of a request from INDERENA, AID will reimburse INDERENA an amount of money equal to 39.1% of the monies it has already expended for the sub-projects proposed in the Project Description. This percentage corresponds to the

amount of AID local cost financing expressed as a proportion of total local cost financing. Subsequent AID disbursement will be calculated on the basis of 39.1% of the monies expended for appropriate subprojects by INDERENA since its previous disbursement request.

All of INDERENA's requests for reimbursement by AID will be accompanied by satisfactory evidence of its claimed expenditures. Regular financial reports and certified copies of payment orders for goods and services purchased in support of the subprojects of this loan will be accepted as satisfactory evidence.

All AID local cost disbursements will be made into a Special Account to be held by the Treasurer exclusively for INDERENA.

## 2. Dollar Disbursements

Dollar disbursements for commodities, participant training, and technical assistance will be made directly by AID using standard obligating documents and procedures. Standard procedures will also govern with respect to procurement, small business notification, shipping and insurance.

### D. Evaluation

#### 1. Procedure

Evaluations will be conducted as needed -- judging from periodic reports submitted with disbursement requests -- but at least once annually during the disbursement period. Since the technical packages which are the part of the research will not all be available until FY 1980, their economic impact will not be felt during the life of the project itself. Thus, an additional follow-up evaluation two to five years after the TDD will be conducted to measure achievement at the purpose and goal level.

All evaluations will be carried out jointly by the Government of Colombia and AID, using whatever TDY assistance may be necessary. The GOC will accept the responsibility for providing all data necessary to the review.

Additional monthly reviews will be conducted by the Mission and its counterparts in DNP and INDERENA in order to measure accomplishment of the targets set forth in the detailed schedules for provision of inputs and production of outputs. These schedules, which are found in Annex II, have been designed jointly by the Mission, DNP, and INDERENA.

This procedure is already successfully being used for the work presently being done at the Repelón Fish Station. In December 1974, USAID and INDERENA developed a schedule for construction of the initial 2.7 hectares of ponds. As of the date of this writing, the regular reviews

have shown that each step has been accomplished either by/or before the target date.

The project will be evaluated in terms of the progress made toward accomplishment of input and output targets and, later, toward accomplishment of the purpose and goal, using the indicators and means of verification shown in the Logical Framework which follows.

## 2. Logical Framework

### a.1. Project Goal

To achieve the progressive nutritional well-being of the Colombian population -- particularly of those segments with the fewest resources -- satisfying its basic dietary necessities with respect to quantity and quality.

#### Project Sub-Goal

To increase production of fresh-water fish, which is viewed as an attractive, low-cost alternative protein source.

### a.2. Measures of Goal Achievement

1. Inland fish production will increase between 1980 and 1985 by a rate greater than the rate of growth of population during the same period.

### a.3. Means of Verification

1. INDERENA statistics on fresh-water fish production.
2. Statistics of ICA, INCORA, CVC, and other extension services on aquaculture fish production.
3. DANE population statistics.

### a.4. Assumptions Affecting Goal Achievement

1. An increased supply of inland fish will lower the price of such fish which in turn will cause a lowering trend in the prices of other sources of protein, bringing them all more within the reach of low-income groups.

2. The GOC will continue its current support for aquaculture and improved fisheries management at least through 1985.

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3. Extension and credit activities will be forthcoming.

4. Increased production resulting from research activities to be supported by proposed loan will begin to appear in 1980.

5. Farmers and artisan fishermen will be receptive to aquaculture systems and the package of improved fisheries management practices respectively.

6. Magdalena River will not become too polluted as to cause decline in population of commercial fish species.

b.1 Project Purpose

To develop economically and technically sound aquaculture systems suitable primarily, but not exclusively, for small farmer use; and to produce a package of management recommendations appropriate for use by artisan fishermen that is designed to rationalize exploitation and, thus, ensure persistence of the fish population of the lower Magdalena River.

b.2.a. Measures of Purpose Achievement

1. Aquaculture systems and package of improved practices for artisan fishermen show positive results in regional, field trials.

2. Technical packages are being disseminated by ICA, INCORA, CVC, and other extension services and adopted by target groups.

b.2.b. Interim Measures of Purpose Achievement

The project purpose will not be accomplished during the life of the project since the last aquaculture package will not be come available until FY 1980. The following indicators will be used to measure progress towards achievement of the purpose during the project's disbursement period.

1. Research initiated according to timetable in Annex II, Exhibit 7.

2. Research plans meet criteria established in the project description for orientation toward small farmers or artisan fishermen.

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3. Reports of research results show plans were followed.

**b.3. Means of Verification**

1. Research station reports on results of regional trials.

2. Reports from extension agencies.

3. Field inspections by GOC and USAID.

4. Evaluations by the USAID and the Contractor (for interim indicators.)

**b.4. Assumptions Affecting Achievement of Purpose**

1. Species exist which are economically culturable by small farmers.

2. Farmers will accept and apply the research finding and techniques generated by the project.

3. It is feasible to rationalize current exploitation of fish in the Magdalena River.

4. Technical assistance will be provided as planned and outputs accomplished.

5. Personnel trained will be assigned to jobs corresponding to their field of training.

**c.1. Project Outputs**

1. Physical facilities constructed and equipped at Repelón, Magangué, in the Upper Magdalena area, and in the Llanos.

2. Program of formal-short courses designed by INDERENA and training Contractor.

3. Personnel trained at M.A. level academic programs in the U.S., in short courses, and in-country training programs.

4. Contracts for research signed by INDERENA with Universities of Caldas, Córdoba, and Valle and with the CVC and INCORA.

5. Technical assistance being provided according to contracts.

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c.2. Output Targets

1. Sites selected as necessary and physical facilities constructed according to time-phased plan in Annex II, Exhibit 7.
2. Training accomplished according to time-phased plan in Annex II, Exhibit 5.
3. Technical assistance provided as per Annex II, Exhibit 6.

c.3. Means of Verification

1. Visual inspection by USAID, INDERENA reports, bills of lading, etc.
2. USAID training records and records of INDERENA and Contractor pertaining to in-country training program.
3. INDERENA reports and those of TA Contractor.

c.4. Assumptions Affecting Achievement of Outputs

1. Inputs become available as planned.

d.1. Project Inputs

1. Local Cost financing of the Construction of Physical Facilities and the Research Program.
2. Purchase of Equipment.
3. Dollar financing of the Training Programs.
4. Dollar Financing of the Technical Assistance.

4.2. Input Targets

1. GOC input of the peso equivalent of US\$1,082,600 and AID input of the peso equivalent of US\$ 695,200
2. AID input of US\$ 514,800
3. AID input of US\$ 410,000
4. AID input of US\$ 580,000

See Table IV-3 for the time-phased schedule for the financial inputs.

d.3. Means of Verification

1. Reimbursement request documentation from the GOC.
2. USAID Controller Records

d.4. Assumptions affecting achievement of inputs.

1. That the GOC makes available the required amount of pesos in a timely manner.

E. CONDITIONS AND COVENANTS

1. Conditions Precedent

In addition to the normal conditions precedent to disbursement, the following shall be required:

- a. Prior to the issuance of any commitment document or to any disbursement under the loan:
  - (i) INDERENA shall submit a time-phased project implementation plan which shall include a schedule showing how the construction, training and technical assistance components of the project will be coordinated; and
  - (ii) INDERENA will submit its Technical Assistance Plan to USAID for its approval. This plan shall list the kinds of technical assistance desired and their proposed sources.
- b. Prior to AID issuance of any commitment documents for participant training, INDERENA shall form a Participant Selection Committee in which AID shall be represented.
- c. Prior to AID disbursement of any funds for construction for a given subproject, INDERENA shall submit all pertinent construction plans, designs, specifications and final cost estimates to AID for its approval.

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2. Covenants

- a. INDERENA shall covenant that it will present in a timely fashion the annual research plan for each station funded under this loan to USAID for its approval.
- b. The Borrower shall covenant that such technical packages as may be forthcoming as a result of the research financed by this loan will be disseminated to the appropriate target groups by the appropriate extension agents and that all other steps necessary to the implementation of those packages will be taken.
- c. The Borrower shall covenant that the existing Project Committee composed of representatives of DNP, the Ministry of Agriculture, and USAID will continue to serve as the coordinating group for project implementation.
- d. INDERENA shall covenant to continue to give consideration to the environmental impact of the project on lake and river management practices and to foster appropriate environmental practices among the fish farmers who will, over time, participate in this project.

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CHECKLIST OF STATUTORY CRITERIA

(Alliance for Progress)

In the right-hand margin, for each item write answer or, as appropriate, a summary of required discussion. As necessary, reference the section(s) of the Capital Assistance Paper, or other clearly identified and available document, in which the matter is further discussed. This form may be made a part of the Capital Assistance Paper.

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended.

FAA, 1973 - Foreign Assistance Act of 1973.

App. - Foreign Assistance and Related Programs Appropriation Act, 1974.

MMA - Merchant Marine Act of 1936, as amended.

BASIC AUTHORITY

1. FAA Sec.103; Sec.104; Sec.105;  
Sec.106; Sec.107. Is loan being made
  - a. for agriculture, rural development  
or nutrition;

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COUNTRY PERFORMANCE

Progress Towards Country Goals

2. FAA Sec.208; Sec.251(b)

A. Describe extent to which country is:

- (1) Making appropriate efforts to increase food production and improve means for food storage and distribution

Colombia is making appropriate efforts through its Office of Agricultural Planning, Institute of Agricultural Marketing, Institute for Development of Natural Renewable Resources, and the Colombian Agricultural Institute. These efforts are more fully described in Section I of this CAS as well as in the analysis of the Agriculture Sector dated March, 1972 as revised May, 1973 and June, 1974.

- (2) Creating a favorable climate for foreign domestic private enterprise and investment.

With respect to domestic private investment a favorable climate has been maintained and investment continues at a respectable rate. With respect to foreign private investment, some enterprises, which might possibly fall within the restrictive provisions of the Andean Code, may have been deterred by the uncertain legal status of the Treaty of Cartagena and the Andean Code from investing in Colombia; but the amount of investment, if any, so deterred is a matter of speculation.

- (3) Increasing the public's role in the developmental process.

The public's role in the development process is clearly being increased, as witnessed by the programs instituted by the Colombian Government under this loan and other programs also assisted by A.I.D. loans, all resulting in substantial increases in the financing of education and of credit to small and medium sized farmers.

- (1) (a) Allocating available budgetary resources to development.

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The Mission has concluded that Colombia's investment in the four crucial sectors of the economy concerned with overall development is both "reasonable and feasible."

(b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations (See Item 10)

It is considered that some expenditure for modernization of Colombia's armed forces is justifiable.

Colombia is not intervening in the affairs of other free and independent nations,

(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

Colombia, with the assistance of the Mission, has embarked on a program of substantially improving tax collection procedures, which has resulted in increased fiscal revenues. Colombia's program of land reform is discussed in detail in Parts One and Two of the 1972 Agricultural Sector Loan Paper. The development plans of the GOC recognize the importance of individual initiative and private enterprise. Individual freedom of press, speech and religion continue.

(6) Adhering to the principles of the Act of Bogotá and Charter of Punta del Este.

Colombia is adhering to the principles of the Act of Bogotá and the Charter of Punta del Este.

(7) Attempting to repatriate capital invested in other countries by its own citizens.

Under the 1967 Foreign Exchange Statute, Colombian nationals were to repatriate demand and time deposits by mid-1967, upon their sale, and no Colombian national was to invest abroad without the prior approval of the Department of Planning. During 1967 it is estimated that up to

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\$50 million was repatriated, which represents the bulk of the capital which was overseas. Presently, very strict laws are in effect which limit severely capital flight from Colombia.

(8) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

The GOC is undertaking effective self-help measures in response to vital concerns of its people.

B. Are above factors taken into account in the furnishing of the subject assistance?

Yes.

Treatment of U.S. Citizens by Recipient Country

3. FAA Sec.620(o). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to U.S. citizen for goods or services furnished or ordered where (a) remedies and (b) debt is not denied or contested by such government?

According to the best information available, Colombia is not known to be so indebted.

4. FAA Sec.620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing-ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

No such action is known to have been taken

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5. FAA Sec.620(o). Fishermen's Protective Act. Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. Fishing vessel on account of its fishing activities in international waters.

Apart from an incident which occurred in 1967, which was satisfactorily resolved, no such seizure, penalty or sanction has occurred.

- a) Has any deduction required by Fishermen's Protective Act been made?

N.A.

- b) Has complete denial of assistance been considered by A.I.D. Administrator?

N.A.

Relations with U.S. Government and other Nations.

6. FAA Sec.620(a). Does receipt country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?

In March, 1975 Colombia reestablished diplomatic relations with Cuba, and will shortly exchange Ambassadors with Cuba.

7. FAA Sec.620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?

Yes.

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8. FAA Sec.620(d). If assistance is for any productive enterprise which will compete in the United States with United States enterprise, is there an agreement by the recipient country to prevent export to the United States of more than 20% of the enterprise's annual production during the life of the loan?

Loan funds will not finance any production enterprise which will directly compete.

9. FAA Sec.620(f). Is recipient country a Communist country?

No.

10. FAA Sec.620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?

No.

11. FAA Sec.620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. Property?

Colombia is taking adequate measures to prevent such damage or destruction.

12. FAA Sec.620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?

The GOC signed an investment guaranty bilateral agreement in 1963, and has cooperated in implementing the guaranty program to date. However, the agreement has not been ratified by the Colombian Congress. For this reason, the "Administrator's Determination" under which the program has operated was not renewed upon its expiration on December 31, 1970. OPIC currently is studying the question of whether to continue the program in Colombia. Pending this study, the Mission recommends against denying assistance.

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13. FAA Sec.620(n). Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?

No.

14. FAA Sec.620(q). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country?

No.

15. FAA Sec.620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

No.

16. FAA Sec.620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget?

Colombia is not delinquent.

17. FAA Sec.481. Has the government of recipient country failed to take adequate steps to prevent narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?

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The Government of Colombia has been made aware of the problem of narcotic drug trafficking and has initiated measures designed to inhibit such trafficking. The President has designated the Minister of Justice as overall coordinator. The Procurador General also has oversight responsibility through the Judicial Police. Seizures of narcotic drugs in the past twelve months have been substantially above earlier periods. The GOC has sponsored or participated in a number of inter-governmental, intragovernmental and public/private seminars, which have served to increase awareness generally and improve technical capacity of law enforcement officials. Staff of control agencies are being trained in narcotics interdiction. Assistance and advice of the USG in these respects has been solicited, provided and utilized.

18. FAA, 1973 Sec.29. If (a) military base is located in recipient country; and was constructed or is being maintained or operated with funds furnished by U.S., and (b) U.S. personnel carry out military operations from such base, has the President determined that the government of recipient country has authorized regular access to U.S., correspondents to such base?

N.A.

Military Expenditures

19. FAA Sec.620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PP/RC).

(a) In 1975, the Ministry of Defense will receive less than 10% of the national budget. Said Ministry's share of the national budget has been declining steadily for the past several years.

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(b) Foreign Exchange Expenditures for Military Equipment:

In CY 1974 the GOC spent \$17 million dollars on military "hardware".

(c) Foreign Exchange Expenditures for Sophisticated Weapons:

In CY 1974 there were no new commitments for Sophisticated Weapons.

CONDITIONS OF THE LOAN

General Soundness

20. FAA Sec.201(d). Information and conclusion on reasonableness and legality (under laws of country and the United States) of lending and relending terms of the loan.

The terms of the proposed loan are consistent with the laws of Colombia and the United States and are not excessive or unreasonable for the Borrower (See Section III).

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21. FAA Sec.251(b)(2); Sec.251(e)  
Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. and application for such funds together with assurances to indicate that funds will be used in an economically technically sound manner?

The project is economically and technically sound. The GOC has submitted an application for the proposed loan and the Mission has been provided sufficient information and assurances to indicate reasonably that the funds will be used in an economically and technically sound manner.

22. FAA Sec.251(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

The terms of the proposed loan are such that there are reasonable prospects for its repayment. (Section III)

23. FAA Sec.251(b). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.

The IBRD, IDB and Ex-Imbank have been advised of this proposed loan and have indicated that they are not interested in financing the program. (See Section III).

24. FAA. Sec.611(a)(1). Prior to signing of loan will there be  
(a) engineering, financial, and other plan necessary to carry out the assistance and  
(b) a reasonably firm estimate of the cost to the United States of the Assistance?
- A) AID has examined the plans, specifications and cost estimates of the Repelon Research Station and finds them satisfactory. The stations on the Upper Magdalena and Eastern Plains sites will be constructed using the same basic plans, specifications and unit cost estimates as the Repelon Station. The costs of the Lower Magdalena Station, involving substantially less construction work, will be based on prevailing unit costs of construction in the Magangue area.
25. FAA Sec.611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of loan?

No further legislation is required except for the yearly Budget Law which is normally approved by the end of each CY. Based upon past performance, there are reasonable expectation that the necessary Budget Laws will be enacted and that the law or amendments thereto will contain the amounts scheduled to be contributed by the GOC.

26. FAA Sec.611(e). If loan is for Capital Assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Yes. See Director's certificate.

Loan's Relationship to Achievement  
of Country and Regional Goals

27. FAA Sec. 207; Sec.251(a); Sec.113  
Extent to which assistance reflects appropriate emphasis

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on: (a) encouraging development of democratic, economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs; (e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (f) integrating women into the recipient country's national economy.

- a) The development of the fisheries sector in Colombia is clearly a reflection of Colombia's determined emphasis on building economic, democratic and social institutions (See also Section IV).
- b) This program will have a direct effect in meeting the country's food needs through improved technology and extension.
- c) Training of fisheries technicians is a component of the loan (See Section II).
- d) Increased fish production caused by the project will improve the general nutrition level by making available more animal protein.
- e) Section IV A of this paper covers this topic.
- f) Section IV E of this paper covers this topic.

28. FAA Sec.209. Is project susceptible of execution as part of regional project?  
If so why is project not so executed?

No.

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29. FAA Sec.251(b)(3). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.

The loan activities relate directly to and are consistent with other sectoral and specific development activities contained in the overall Colombia 74 Food and Nutrition Plan.

30. FAA Sec.251(b)(7). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.

See comment under Item 29 above.

31. FAA Sec.209; Sec.251(b)(8)  
Information and conclusion whether assistance will encourage regional development programs, and contribute to the economic and political integration of Latin America.

Loan has not direct bearing on achieving such integration.

32. FAA Sec.251(g); Sec.III. Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.

N.A.

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33. FAA Sec.251(h). Information and conclusion on whether the activity is consistent with the findings and recommendation of the Inter-American Committee for the Alliance for Progress in its annual review of national development activities.

This loan is consistent therewith.

34. FAA Sec.281(a). Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private, and local governmental institutions.

Section IV hereof outlines the expected impact of the program on the people of Colombia, and concludes that it will increase participation by the populace in the development process.

35. FAA Sec.281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

Section I A of this loan paper describes the need for assisting fisheries development in Colombia. A portion of the funds made available under the loan will be used to train personnel concerned with management and planning, which will serve to encourage institutional development.

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36. FAA Sec.601(a). Information and conclusions whether loan will encourage efforts of the country to (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce and (f) strengthen free labor unions.

- a) N.A.
- b) The loan will foster private initiative and competition by promoting aquaculture among small farmers and improving the stocks of artisan fishermen.
- c) N.A.
- d) N.A.
- e) One of the purposes of the loan is to strengthen the technical efficiency of the Institute for Natural Resource Development.
- f) N.A.

37. FAA Sec.619. If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?

N.A.

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Loan's Effect on U.S. and A.I.D. Program

38. FAA Sec.251(b)(4); Sec.102. Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

The Mission does not contemplate any adverse effect on U.S. economy.  
(See Section IV)

39. FAA Sec.252(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.

None of the loan funds will go to private enterprise. The results of research will be made available to private enterprise. Loan funds will be used to finance imports from U.S. sources.

40. FAA Sec.601(b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

(See Section II and IV)

41. FAA Sec.601(d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

Yes.

42. FAA Sec.602. Information and conclusions whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan

See Item 39 above

43. FAA Sec.620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?

No.

44. FAA Sec.621. If technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as good and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

See Item 39 above.

Loan's Compliance with Specific Requirements

45. FAA Sec.110(a); Sec.208(e). Has the recipient country provided assurances that it will provide at least 25% of the costs of the program project, or activity with respect to which to Loan is to be made?

Yes. See Section III.

46. FAA Sec.112. Will loan be used to finance police training or related program in recipient country?

No.

47. FAA Sec.114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions?

No.

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48. FAA Sec.201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?

Yes.

49. FAA Sec.604(a). Will all commodity Procurement financed under the loan be from the United States except an otherwise determined by the President?

Yes.

50. FAA Sec.604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?

The Loan Agreement and Implementation Letters will so provide.

51. FAA Sec.604.(d). If the cooperating country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the United States on commodities financed by the loan?

Goods to be financed under the proposed loan will be purchased on a CIF basis with the responsibility for the purchase of marine insurance being left to the exporter. The loan agreement will contain such a clause.

52. FAA Sec.604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?

N.A.

53. FAA Sec.604(f). If loan finances a commodity import program, will arrangements be made for supplier certification to A.I.D. and A.I.D. approval of commodity as eligible and suitable?

N.A.

54. FAA Sec.608(a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement or new items.

The loan agreement will contain a provision enjoining Borrower to use U.S. excess property under appropriate circumstances.

55. FAA Sec.611(b); App-Sec.101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1962?

N.A.

56. FAA Sec.611(c). If contracts for construction are to be financed, what provision will be made that they be let on a competitive basis to maximum extent practicable?

Colombian law so requires.

57. FAA Sec.612(b); Sec.636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the United States are utilized to meet the cost of contractual and other services.

See Section III E of this loan paper.

58. App.Sec. 113. Will any of loan funds be used to acquire currency of recipient country from non-U.S. Treasury sources when excess currency of that country is on deposit in U.S. Treasury?

No.

59. FAA Sec.612(d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release?

No.

60. FAA Sec.620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?

Loan Agreement will not permit such use.

61. FAA Sec.620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed \$100 million?

No.

62. FAA Sec.636(i). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States, or any guaranty of such a transaction?

No.

63. App.Sec.103. Will any loan funds be used to pay pensions, etc., for military personnel?

No.

64. App.Sec. 105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?

Yes.

65. App. Sec. 107. Will any loan funds be used to pay UN assessments?

No.

66. App. Sec.109. Compliance with regulations on employment of U.S. and local personnel (A.I.D.) Regulation 7).

N.A.

67. App. Sec.110. Will any of loan funds be used to carry out provisions of FAA Secs.209(d) and 251(h)?

Such is not anticipated.

68. App. Sec.114. Describe how the Committee on Appropriations of The Senate and House have been or will be notified concerning the activity, program, project country, or other operation to be financed by the Loan.

They will be notified by letter prior to authorization.

69. App. Sec.601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by the Congress?

No.

70. MMA Sec.901(b); FAA Sec.640(c)  
(a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be

transported on privately owned U.S.  
flag commercial vessels to the  
extent that such vessels are available  
at fair and reasonable rates.

Loan agreement will contain a provision in compliance with this  
requirement.

(b) Will grant be made to loan recipient  
to pay all or any portion of such differential  
as may exist between U.S. and foreign-flag vessel  
rates?

No.

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ANNEX 1  
Exhibit 2

ANNEX I

Exhibit 2

CERTIFICATION PURSUANT TO SECTION 611(e)  
OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

SUBJECT: COLOMBIA - Capital Assistance - Fish Production Loan

Having taken into account, among other things, the maintenance and utilization of projects in Colombia previously financed or assisted by the United States, I certify hereby that in my judgment Colombia has the financial capability and the human resources (when supplemented by the specific external technical assistance to be required under the proposed loan) to maintain and utilize effectively the proposed Fish Production Loan.

This judgment is based primarily on the facts developed in the Capital Assistance Paper for the proposed loan of \$2.2 million, and the manner in which the various Colombian government agencies scheduled to receive funds under the loan have utilized resources provided by the United States Government on prior occasions.



William A. Ellis

May 1, 1975

Date

A.I.D. Loan No. \_\_\_\_\_

DRAFT LOAN AUTHORIZATION

Provided from: FAA Section 103 ("Food and Nutrition")  
COLOMBIA: Fish Research

Pursuant to the authority vested in the Deputy U.S. Coordinator, Alliance for Progress by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a Loan ("Loan") pursuant to Section 103 of said Act to the Government of Colombia ("Borrower") of not to exceed two million two hundred thousand United States dollars (\$2,200,000) to assist in financing the United States dollar and local currency costs of the Borrower's program in fish production and marketing of fish.

The Loan shall be subject to the following terms and conditions:

1. Interest and Terms of Repayment: Borrower shall repay the Loan to A.I.D. in United States dollars within forty (40) years from the first disbursement under the Loan, including a grace period of not to exceed ten (10) years. Borrower shall pay to AID in United States dollars, on the outstanding balance of the Loan, interest at the rate of two percent (2%) per annum during the grace period, and three percent (3%) per annum thereafter on the outstanding disbursed balance of the Loan and unpaid interest.

2. Other Terms and Conditions:

- (a) Goods and services (except ocean shipping) financed under the Loan shall have their source and origin in Colombia or in countries included in Code 941 of the A.I.D. Geographic Code Book. Marine insurance financed under the Loan shall be procured by the exporter on a CIF basis and placed in any country included in Code 935 of the A.I.D. Geographic Code Book. Ocean shipping financed under the Loan shall be procured in any country included in A.I.D. Geographic Code 941.

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- (b) United States dollars utilized under the Loan to finance local currency costs shall be made available pursuant to procedures satisfactory to A.I.D.
- (c) Prior to issuance of any commitment document or to any disbursement under the loan:
  - (i) INDERENA shall submit a time-phased project implementation plan which shall include a schedule showing how the construction, training and technical assistance components of the project will be coordinated;
  - (ii) INERENA will submit its Technical Assistance Plan to USAID for its approval. This plan shall list the kinds of technical assistance desired and their proposed sources.
- (d) Prior to issuance of any commitment document for participant training, INDERENA shall form a Participant Selection Committee in which AID shall be represented.
- (e) Prior to disbursement of any funds for construction of any subproject, INDERENA shall submit all pertinent construction plans, designs, specifications and final cost estimates to AID for its approval.
- (f) The Loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

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AID-DLC/P-2086  
ANNEX I  
Exhibit 4  
Page 1 of 2

UEA - 0109  
Agrarian Studies Unit

Bogotá, April 30, 1975

Mr. William A. Ellis  
Director USAID/Bogotá  
Edificio Bavaria  
La Ciudad

Dear Mr. Ellis:

In consideration of the suggestion from AID/Washington that it was not possible to include the trout programs of the Tota and Berlin Stations in the Loan for financing the Continental Fisheries and Aquaculture Development Project in Colombia, it is necessary to modify the total costs of the project as they appear in our application submitted to AID on April 14, 1975, in accordance with letter No. UEA - 081

Final costs and GOC contribution for this project will be as follows:

	Total costs of the Project (US\$ value)	%
Equipment	514,800	16.7
Contracts	189,404	6.2
Technical Assistance	380,000	12.3
Training	410,000	13.3
Construction & Administration of the stations	<u>1,588,396</u>	<u>51.5</u>
	3,082,600	100.0

Out of this total, the allotments corresponding to contracts, constructions and administration will be paid in local currency, i.e., the

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equivalent of US\$1,777,800, out of which US\$1,082,600 will be the GOC contribution and US\$695,200 will be the AID contribution for local costs. Other expenses, i.e., US\$1,304,800, corresponding to the allotments for equipment purchase, technical assistance and training will be paid in dollars and will not require GOC contribution. As was mentioned above, the GOC contribution to be budgeted has been calculated only on the local currency costs (US\$1,082,600), which is equivalent to 60.9% of the local currency cost of the project (US\$1,777,800); however, if the total cost of the project is considered (US\$3,082,800), the GOC contribution (US\$1,082,600) will represent 35% of total cost and AID will contribute the other 65% (US\$2,000,000).

Yours very truly,

(Signed) Sergio Durán  
Chief of Agrarian Studies Unit  
National Planning Department

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REPUBLICA DE COLOMBIA  
DEPARTAMENTO NACIONAL  
DE PLANEACION

AL COMITÉ DE ESTUDIOS AGRARIOS  
UEA-081

Unidad de Estudios  
Agrarios

ACTION:
Recepción
INFO:
DIR: A. DUC
CHRON
COHEN - 2
BOGOTA, D. E.
DUE BY:
4-18-75

14 ABR. 1975

Señor doctor  
WILLIAM A. ELLIS  
Director  
Agencia Internacional para el  
Desarrollo A. I. D.  
La Ciudad

Estimado doctor:

El Gobierno de Colombia a nivel del CONPES definió los objetivos del Plan Nacional de Nutrición y dentro de el incluyo uno de los proyectos más importantes, como es el del Plan de Desarrollo de Pesca Continental y Acuicultura en Colombia.

El logro de las metas planteadas en este proyecto constituyen una de las aspiraciones del Gobierno de Colombia, para alcanzar la necesaria disponibilidad de proteína de origen animal.

Anexo a la presente encontrará una síntesis de la evaluación que realizó este Departamento a través de la Unidad de Estudios Agrarios, al igual que el documento presentado por el INDERENA.

Por todo lo anterior considero que este Proyecto se le debe asignar la primera prioridad en la distribución de los recursos financieros de la A.I.D. para el Sector Agropecuario.

Atentamente,

Rural Development Division  
Date Received 4/14/75  
A.G./Bogotá, Colombia

  
MIGUEL URRUTIA M.  
Jefe del Departamento

cc: Dr. Rafael Pardo B.  
Dr. Julio Carrizosa

Ministro de Agricultura  
Gerente General Inderena

Anexo: lo anunciado

## MEMORANDO

PARA: Dr. WILLIAM ELLIS  
Director A. I. D.

DE: Dr. MIGUEL URRUTIA  
Director Departamento Nacional de Planeación

REF: Financiamiento del Proyecto de Desarrollo de la  
Pesca Continental y la Acuicultura en Colombia.

Introducción.

El INDERENA ha presentado a consideración de esta Unidad el documento de financiación para adelantar el " Proyecto de Desarrollo de la Pesca Continental y la Acuicultura en Colombia"; plantea en él la estrategia a ejecutar para aumentar el consumo de proteína animal del pueblo colombiano siguiendo los lineamientos del " Plan Nacional de Nutrición".

Las estrategias están basadas en los adelantos investigativos logrados por el actual Proyecto INDERENA - FAO Pesca Continental Col/71/552 el cual inició labores en Septiembre de 1.972 con una inversión por parte de la FAO de US\$ 720.000 y como contrapartida del gobierno colombiano aporte de \$35.274.000. En la actualidad se ha solicitado a la FAO un aumento de fondos para el Proyecto, equivalente a los US\$ 600.000 con el fin de realizar acciones inmediatas de producción.

La financiación solicitada pretende complementar las acciones del Proyecto Pesca Continental mediante la construcción de estaciones piscícolas y de biología pesquera, así como ejecutar programas de entrenamiento en el exterior, contratos con otras entidades y cursos de asistencia técnica dentro del país.

Justificación

Hay aproximadamente 200.000 pescadores artesanales en Colombia, con un promedio de 5 personas dependientes por pescador, lo cual significa que apro-

ximadamente un millón de personas derivan su sustento de la pesca.

El consumo de productos pesqueros en Colombia es solamente de 2,5 kilogramos (1969 - 1973) per-cápita lo cual comparado con otros países latinoamericanos como Ecuador donde el consumo es de 9 kilogramos, 11 kilogramos en Panamá y 13 en Perú, Chile y Venezuela, el consumo nacional no representa ni la tercera parte del existente en esos países.

Los recursos pesqueros de Colombia se encuentran distribuidos en nuestras costas y en los 3.7 millones de hectáreas de nuestros ríos, lagos y ciénagas (14.286 millas cuadradas). Nuestros recursos pesqueros de aguas continentales no han sido evaluadas totalmente. La producción comercial del Río Magdalena es aproximadamente de 25.000 a 30.000 toneladas por año, la cual es mayor que la obtenida conjuntamente entre los Océanos Atlántico y Pacífico.

#### Distribución de Producción

	1970		1971		1972	
	Tonelada	%	Tonelada	%	Tonelada	%
Aguas Continentales	22.441	51.2	23.821	46.8	47.409	62.3
Océano Atlántico	13.665	31.1	15.933	32.7	20.049	26.3
Océano Pacífico	7.764	17.7	9.019	18.5	8.668	11.4
<b>Total</b>	<b>43.870</b>	<b>100.0</b>	<b>48.773</b>	<b>100.0</b>	<b>76.126</b>	<b>100.0</b>

Si tomamos en cuenta que actualmente el 50 % de la producción pesquera colombiana, proviene de aguas continentales y que el aumento de la población es mucho más rápido que la producción total de proteína animal, debemos considerar que es necesario hacer un esfuerzo considerable en el aumento de productos pesqueros de aguas continentales, mediante la práctica de la acuicultura y el mejor manejo de ríos y lagos.

Fuente. FAO - INDERENA - Minagricultura. Investigación sobre Mercadeo de Pescado.

La acuicultura se define como la reproducción de peces en cautividad, aplicable tanto para los grandes agricultores como para los pequeños agricultores o miniindustriales. Se ha probado que es más económico y de mayor rendimiento producir en una hectárea de tierra pescado, que carne roja y que muchas tierras que son improductivas para la ganadería o la agricultura, pueden ser utilizadas en la acuicultura.

Con un buen manejo en una hectárea de tierra se puede producir de 2.000 a 3.000 kilogramos de pescado, mientras que en esa misma hectárea, solamente se pueden producir de 600 a 700 kilogramos de carne roja. Igualmente la alimentación requerida para la ganadería o la avicultura es más costosa que la requerida en la acuicultura ya que en ésta última los nutrientes en la mayoría de los casos son nutrientes naturales.

#### Objetivos.

Los objetivos buscados con la presente financiación los podemos resumir a continuación:

- a- Aumento de la producción de pesca continental, desarrollando la acuicultura y el manejo de poblaciones pesqueras.
- b- Disminución del precio unitario del pescado en base al aumento de producción.
- c- Promoción del consumo de pescado en las clases populares.
- d- Aumento del consumo de proteína animal en la dieta alimenticia del pueblo colombiano, especialmente para las clases de más bajos ingresos.
- e- Mejoramiento de las técnicas de procesamiento y manipulación del pescado.
- f- Generación de empleo en las áreas rurales.
- g- Entrenamiento especializado en pesca continental, del personal gubernamental del sector agrícola.
- h- Vinculación de las Universidades y corporaciones regionales colombianas al desarrollo acuicola del país.

Medios.

Los medios contemplados, para alcanzar los anteriores objetivos están descritos ampliamente en el documento que anexamos al presente memorando, los cuales brevemente describimos a continuación:

- a - Se considera la construcción e implementación de las estaciones piscícolas de Repelón, Llanos Orientales, Alto Magdalena, Tota, Berlín y la estación de Biología Pesquera del Bajo Magdalena. Las funciones de estas estaciones serán, las de adelantar las investigaciones pertinentes y la de producir alevinos para la repoblación de ríos, lagos y ciénagas al igual que la demostración a nivel rural de las prácticas de acuicultura.
- b - Se comprarán los equipos necesarios para dotar las estaciones de puenos laboratorios de investigación.
- c - Se harán contratos de investigación y fomento acuícola entre el INDERENA, y las universidades o corporaciones regionales.
- d - Se enviará al exterior para capacitación a nivel de post-grado en materia de pesca de aguas continentales, al personal del sector agrícola, que esté en estrecho contacto con el Proyecto ( 17 personas).
- e - Igualmente se organizarán cursos en el país, en las distintas áreas de las pesquerías de aguas continentales.

Se ha contemplado dentro del empréstito una partida para asistencia técnica externa, la cual sería contratada por el Gobierno colombiano, en el caso de que la FAO no firmara antes del 30 de junio del presente año la ampliación técnica y económica que el Gobierno Nacional le ha solicitado.

Costos y Contrapartida.

El costo total del Proyecto, sin contemplar el financiado por la FAO asciende a la suma de US\$ 3.358.819 distribuidos de la siguiente manera:

Costo Total del Proyecto		
	Valor US\$	%
Equipo	643.879	19.1
Contratos	189.404	5.6
Asistencia Técnica	430.000	12.8

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	Valor US\$	%
Entrenamiento	410.000	12.4
Construcción y funcionamiento estacionales	1,685.536	50.1
	<hr/>	<hr/>
TOTAL	US\$ 3.358.819	100 %

Ver anexo 1

Del anterior total, los rubros correspondientes a contratos, construcciones y funcionamiento, serán hechos en moneda local, es decir el equivalente a US\$ 1.879.940 de los cuales US\$ 1.218.707 serán los dineros de contrapartida del costo total del Proyecto, otorgados por el Gobierno colombiano y US\$ 656.233 de la A. I. D. para gastos locales - Anexo 2 - 3. Los costos restantes ó sea US\$ 1.483.879, correspondientes a los rubros de compra de equipo, asistencia técnica y entrenamiento, serán hechos en dólares y no requerirán contrapartida por parte del Gobierno colombiano. Como se dijo anteriormente el monto de las contrapartidas a situar ha sido unicamente calculado sobre los costos en moneda local ( US\$ 1.218.707) lo cual equivale al 65% del costo total del Proyecto ( US\$ 1.874.490) pero ~~no~~ tenemos en cuenta el costo total del Proyecto ( US\$ 3.358.819) los dineros de contrapartida ( US\$ 1.218.707) representan un 36 % del costo total y la A. I. D. coopera con el 64 % restante ( US\$ 2.140.112).

Los costos de construcción y funcionamiento de las cinco estaciones piscícolas se han distribuido de la siguiente manera:

	Valor US\$	%
Estación de Repelón	US\$ 642.063	34.2
Estación Bajo Magdalena	152.216	8.1
Estación Llanos Orientales	453.659	24.2
Estación Alto Magdalena	218.254	11.6
Estación Tota / Berlin	219.344	11.7
	<hr/>	<hr/>
	US\$ 1.685.536	89.9
Contratos	189.404	10.1
	<hr/>	<hr/>
	US\$ 1.874.940	100 %

Las distribuciones presupuestales se muestran en el Anexo No. 2

Las contrapartidas contempladas por años, se pueden observar en el siguiente cuadro:

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1975	\$ 7.964.906	US\$ 248.903	US\$1 = \$32
1976	15.400.595	452.958	US\$1 = \$34
1977	13.856.743	384.909	US\$1 = \$36
1978	5.013.616	131.937	US\$1 = \$38
<hr/>			
TOTAL	42.235.860	US\$1.218.707	

Las contrapartidas correspondientes para el segundo semestre de 1975 cuyo valor es de \$ 7.964.906 serán ubicadas al INDERENA, de recursos de presupuesto adicional, recientemente solicitados al Ministerio de Hacienda.

### Conclusiones.

- a - Se hace necesario concluir las investigaciones iniciadas por el INDERENA y la FAO y comenzar la reproducción masiva en cautividad de las especies estudiadas anteriormente.
- b - Teniendo en cuenta las políticas trazadas por el actual gobierno en lo referente al Plan Nacional de Nutrición, el Proyecto de Desarrollo de la Pesca Continental y la Acuicultura representa una de las soluciones a corto plazo, para el aumento de consumo de proteínas a nivel popular.
- c - La creación de nuevas fuentes de trabajo contribuirá en la disminución de los actuales niveles de desempleo y naturalmente va ligado al anterior punto.
- d - El entrenamiento de personal colombiano en las pesquerías de aguas continentales, contribuirá al desarrollo armónico de la pesca en el país.
- e - Los estudios realizados por las Corporaciones regionales y las Universidades, contribuirán a una mejor coordinación de las actividades que adelanta el INDERENA y a la actualización de esas entidades en la problemática nacional.

### Recomendaciones.

Después de haber analizado el documento presentado por el INDERENA para la financiación del Proyecto de Desarrollo de la Acuicultura en Colombia, teniendo en cuenta que se ajusta a los objetivos planteados en el Plan Nacional de Nutri-

DEPARTAMENTO NACIONAL DE PLANEACION

ción en base a las conclusiones anteriormente presentadas, el Departamento Nacional de Planeación da concepto favorable para la financiación, del Proyecto propuesto por el INDERENA.

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A N E X O No. 1

ESTIMACION COSTOS TOTALES

COSTOS LOCALES

	<u>c o s t o s</u>					<u>D ó l a r e s</u>				
	1975	1976	1977	1978	Total	1975	1976	1977	1978	Total
Servicios Personales	1.649.102	5.490.424	8.161.367	4.501.856	19.802.749	51.534	161.463	226.705	118.470	558.192
Mantenimiento y Seguros	- o -	900.000	1.850.000	1.165.000	3.915.000	- o -	26.471	51.389	30.654	108.518
Contratos	1.035.000	2.970.000	1.870.600	675.000	6.550.000	32.344	87.353	51.944	17.763	189.404
Viajes y Viáticos	90.000	350.000	410.000	220.000	1.070.000	2.812	10.295	11.389	5.790	30.286
Comunicaciones	8.600	22.800	29.700	16.600	77.700	269	671	825	437	2.202
Servicios Médicos	11.000	25.000	27.000	14.800	77.800	344	735	750	390	2.219
Suministro y Materiales	300.000	1.275.000	1.725.000	1.000.000	4.300.000	9.375	37.500	47.917	26.316	121.108
Publicaciones	10.600	110.000	245.000	120.000	485.000	313	3.235	6.805	3.158	13.511
Compra de Tierra	150.000	800.000	- o -	- o -	950.000	4.687	23.530	- o -	- o -	28.217
Construcciones	9.060.000	11.750.000	7.000.000	- o -	27.750.000	281.250	345.588	194.445	- o -	821.283
<b>SUB-TOTAL</b>	<b>12.253.702</b>	<b>23.693.224</b>	<b>21.318.667</b>	<b>7.713.256</b>	<b>64.978.249</b>	<b>482.928</b>	<b>696.861</b>	<b>592.169</b>	<b>202.982</b>	<b>1.874.940</b>
<u>Costo en Dólares</u>										
Equipo	- o -	- o -	- o -	- o -	- o -	370.148	273.731	- o -	- o -	643.879
Entrenamiento	- o -	- o -	- o -	- o -	- o -	410.000	- o -	- o -	- o -	410.000
Asistencia Técnica	- o -	- o -	- o -	- o -	- o -	430.000	- o -	- o -	- o -	430.000
<b>SUB-TOTAL</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>1.200.148</b>	<b>273.731</b>	<b>- o -</b>	<b>- o -</b>	<b>1.473.879</b>
<b>GRAN TOTAL</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>- o -</b>	<b>1.585.076</b>	<b>970.592</b>	<b>592.169</b>	<b>202.982</b>	<b>3.358.819</b>

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Anexo No. 2

ESTIMACION DE CONTRAPARTIDAS ANUALES

A PAGAR POR INDERENA (EN PESOS)

ACTIVIDAD	1975	1976	1977	1978	TOTAL
Servicios Personales	1.071.916	3.586.775	5.304.888	2.926.206	12.871.785
Mantenimiento y Aseguros	-----	585.000	1.202.500	757.250	2.544.750
Contratos	672.750	1.930.500	1.215.500	438.750	4.257.500
Viajes y Viáticos	58.500	227.500	266.500	143.000	695.500
Comunicaciones	5.590	14.820	19.305	10.790	50.505
Servicios Públicos	7.150	16.250	17.500	9.620	50.570
Suministros y Materiales	195.000	828.750	1.121.250	650.000	2.795.000
Publicaciones	6.500	71.500	159.250	78.000	315.250
Compra de tierra	150.000	800.000	-----	-----	950.000
Construcciones	5.797.500	7.357.500	4.550.000	-----	17.705.000
<b>TOTAL</b>	<b>7.964.906</b>	<b>15.400.595</b>	<b>13.856.743</b>	<b>5.013.616</b>	<b>42.235.860</b>
<b>TOTAL US\$</b>	<b>248.903</b>	<b>452.958</b>	<b>384.909</b>	<b>131.937</b>	<b>1.218.700</b>
	US\$ 1 = \$32	US\$ 1 = \$34	US\$ 1 = \$36	US\$ 1 = \$ 38	

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Anexo No. 3

ESTIMACION DE GASTOS LOCALES A FINANCIAR POR A. I. D.

ACTIVIDAD	1975	1976	1977	1978	TOTAL
Servicios Personales	577.186	1.921.649	2.856.479	1.575.650	6.930.964
Mantenimiento y Aseguros	-----	315.000	647.500	407.750	1.370.250
Contratos	362.250	1.039.500	654.500	236.250	2.292.500
Viajes y Viáticos	31.500	122.500	143.500	77.000	374.500
Comunicaciones	3.010	7.980	10.395	5.810	27.195
Servicios Públicos	3.850	8.750	9.450	5.180	27.230
Suministros y Materiales	105.000	446.250	603.750	350.000	1.505.000
Publicaciones	3.500	38.500	85.750	42.000	169.750
Compra de tierra	-----	-----	-----	-----	-----
Construcciones	3.202.500	4.392.500	2.450.000	-----	10.045.000
<b>TOTALES</b>	<b>4.288.796</b>	<b>8.292.629</b>	<b>7.461.324</b>	<b>2.699.640</b>	<b>22.742.389</b>
<b>US\$</b>	<b>134.024</b>	<b>243.900</b>	<b>207.259</b>	<b>71.043</b>	<b>656.226</b>

UNCLASSIFIED

TENTATIVE EQUIPMENT LIST

<u>Laboratory Equipment</u>	<u>R</u>	<u>LL</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
Binocular Microscope \$250	2	2	1	1	6	1,500.00
Research Microscope \$350	1	1		1	3	1,050.00
Sedgwich Rafter Counter Cell \$25	1	1	1		3	75.00
Whipple Ocular Micrometer \$36	1	1	1	1	4	144.00
Microscope Slides, covers lips, etc. \$300	3	3	1	1	8	2,400.00
Ph Meter \$600	2	1		1	4	2,400.00
Metler Type Analytical Balance \$1,000	1	1			2	2,000.00
Semi-Analytical Balance \$500	1	1	1	1	4	2,000.00
Set of Weight 0-10 Kg. \$200	1	1	1	1	4	800.00
Set of Weight 0-100 Kg. \$200	1	1	1	1	4	800.00
Triple Beam Balance (3.Kg.) \$50	1	1	3		5	250.00
Dial Face Type Scales 0-25 Kg. \$75	2	2	1		5	375.00
Dial Face Type Scales 0-50 Kg. \$75	2	2	1		5	375.00
Platform Type Scale 500 Kg. \$250	1	1			2	500.00
Water Destiller \$600	1	1		1	3	1,800.00
Ekman Drag \$120	2	2	2	1	7	840.00
Water Sampling Kit \$25	3	3		1	7	175.00
DR-EL Water Analysis Kit \$700	1	1	1	1	4	2,800.00
Portable Chloride Tester \$8	3	3			6	48.00
Portable Water Analysis Kit \$65	3	3	1	1	8	520.00
Cyanide Field Test Kit \$42	1	1			2	84.00
Pocket Thermometers (centigrade) \$4.00	24	24	12	12	72	288.00
Hand Lenses 10 x Magn. \$30	12	12	6	6	36	1,080.00
Homogenizer \$400	1	1			2	800.00
Magnetic Stirrer \$75	1	1		1	3	225.00
Magnetic Stirring Bars \$6.00	12	12		6	30	180.00

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	<u>R</u>	<u>LL</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
Laboratory Thermometers \$15	3	3	1	1	8	120.00
Dissecting Kit and Pans \$130	2	2	1	1	6	780.00
Fish Hatching Incubator Jar (Plastic) \$30	25	25		12	62	1,860.00
Funel Type Incubator Jar (Plastic) \$60	25	25		12	62	3,720.00
Catfish Type Aluminum Hatching troughs 20"x10"x10" \$100	6	6		3	15	1,500.00
Miscellaneous Equipment	-	-	-	-	-	7,954.00
20 Meter Tape Measurer \$20	4	3	3		12	240.00
Auger Screw Type \$35	2	2		1	5	175.00
Plankton Nets \$200	5	5	2	2	14	2,800.00
Siens Sets of Various Sizes \$200	3	3	2	1	9	1,800.00
12 ft. deep x 200 feet long #9 nylon net w/ 1/2 hole \$750	1	3	3		7	5,250.00
12 ft. deep x 100 feet long #24 nylon net w/ 1/2 inch hole \$500	2	2	2	1	7	3,500.00
8 ft. deep x 30 feet long #24 nylon net w/ 1/4 inch hole \$100	3	2	2	1	8	800.00
15 ft. x 4 ft. common sense Minnew screen \$10	2	2	2	1	7	70.00
Boat dip nets nylon 1/4" hole 4' - 6' handles \$25	6	6	6	5	23	575.00
PVC handle boat nets with 3/4" holes 10'-12' handles \$30		10	10		20	600.00
Umbrella nets 1/4" holes delta type \$10	5	5	5		15	150.00
<u>Bulk Netting</u>						
1/8" hole 6 ft. deep \$6/ft.	300	300	300	150	1,050	6,300.00
	ft.	ft.	ft.	ft.	ft.	
1/4" hole 8 ft. deep \$4/ft.	100	100	100	50	350	1,400.00
	ft.	ft.	ft.	ft.	ft.	
1/2" hole 12 ft. deep \$3/ft.	120	120	120	60	420	1,260.00
	ft.	ft.	ft.	ft.	ft.	

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	<u>R</u>	<u>LL</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
<u>Net Twines</u>						
# 12 33#	8#	16#	16#	4#	44#	132.00
#7 33#	6#	12#	12#	3#	33#	99.00
#5 33#	4#	8#	8#	2#	22#	66.00
<u>Rope</u>						
#15 1/2" 1200' spool nylon \$125	2	2	2	2	8	1,000.00
#15 1/2" 1200' spool poly \$140	2	2	2	2	8	1,120.00
# 8 1/4" 1200' spool nylon \$ 50	2	2	2	2	8	400.00
# 8 1/4" 1200' spool poly \$ 60	2	2	2	2	8	480.00
Saran Screen \$5.00 yd.	200yds.	200yds		100yds.	500yds.	2,500.00
Electronic Calculators with Functions \$650	1	1	1	1	4	2,600.00
<u>Boats</u>						
12' HD worked aluminum \$200 (flat bottomed)	2	4		1	7	1,400.00
14' - 16' fiber glass flat bottom \$1000	1	2			3	3,000.00
Heavy Duty trailer 600# axel \$175	2	2	1	1	6	1,050.00
18' Aluminum fitted for electro fishing gear with line well \$550				1	1	550.00
16' Aluminum flat bottom \$450				1	1	450.00
14' Fiber glass V bottom \$1,000				1	1	1,000.00
40 HP Hand tiller outboard \$1,000		4	4		8	8,000.00
15 HP " " " \$ 700	3	3		1	7	4,900.00
4 HP " " " \$ 500	4	4			8	4,000.00
Laboratory boat \$45,000				1		45,000.00
Air compressor 2HP \$750	1	1			2	1,500.00
Air compressor 1-1/2 HP \$250	1	1		1	3	1,950.00
600 Psi equipment Washer \$750	1	1			2	1,500.00
Gasoline motor driven water pump 1-1/2" \$250	1	1		1	3	750.00

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	<u>R</u>	<u>LL</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
Gasoline motor driven water pump 2" \$325	1	1	1	1	4	1,300.00
Gasoline Engines 12 HP \$400	2	2	1	1	6	2,400.00
40 HP Tractor \$6,000	1	1			2	12,000.00
Trailer for Tractor 2 wheel \$650	1	1			2	1,300.00
Full type wheel disc for tractor \$1,000	1	1			2	2,000.00
Sicke bar mower for tractor \$800	1	1			2	1,600.00
Rotary mower for tractor \$1,000	1	1			2	2,000.00
PTO Driven pump 3 Pt hited \$600	1	1			2	1,200.00
3 Pt hited 6 ft. blade for tractor \$650	1	1			2	1,300.00
<u>Chemical Supplies</u>						
Emulsified Roteron 5 gal. drums \$80	5	5			10	600.00
Fish Grader boxes \$75	4	4		2	10	750.00
Fish Grader Baskets - various sizes \$45	6	6		3	15	675.00
Plastic Bags 10 x 12 x 2 ml. \$30/1000	2000	2000		2000	6000	180.00
Plastic Bags 18 x 32 x 3 ml. \$100/1000	2000	2000		2000	6000	600.00
Minnew-Savor Type Agitators \$45	12	12	4	4	32	1,440.00
Hard rubber 2" rubber bands \$5/1000	4000	4000		4000	1200	60.00
Fiber glass transport tanks 73" x 50" x 18" \$425	3	3	1	1	3	4,250.00
Carryall				1	1	6,000.00
3/4 Ton Pickup 4 x 4 Truck with winch \$6,000	1	1	1		3	18,000.00
1/2 Ton regular HD Pickup \$5,000	1	1		1	3	15,000.00
2 Ton Truck 4 x 4 \$16,000	1	1			2	32,000.00
Jeeps or double cab pickups \$8,000	2	2	1	1	6	36,000.00
Grinder for feeds (grain) \$1,500	1	1		1	3	4,500.00
Mixer 15 cu.ft. \$2,800	1	1		1	3	8,400.00
Laboratory Pellet Mill \$5,600	1	1		1	3	16,800.00
Hammer Mill \$1,200	1	1		1	3	3,600.00

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	<u>R</u>	<u>LI</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
Forced Air Drying Oven \$3,000	1	1		1	3	3,000.00
Meat Grinder \$500	1	1		1	3	1,500.00
Aquariums 40 liters \$45	40	40		20	100	4,500.00
Accessories \$15	40	40		20	100	1,500.00
Forced Air blower for handling house \$2,000	1	1		1	3	6,000.00
50 Meter Steel Measuring Tapes \$25			1		1	25.00
Water Sampling Bottles \$100/24	24	24	24	12	84	350.00
Camping Gear \$1000	1	1	1	1	4	4,000.00
Reference Books	\$1000	\$1000	\$1000	\$1000	\$4000	4,000.00

#### Miscellaneous Equipment

Carborundum Stones \$5	2	2			4	20.00
1/8" mesh hardware cloth \$120/roll	100ft.	100ft.			200ft.	240.00
1/4" " " " \$100/roll	100ft.	100ft.			200ft.	200.00
1/2" " " " \$ 90/roll	100ft.	100ft.			200ft.	180.00
Floor Jack 20 Ton hydraulic \$100	1	1			2	200.00
Handy Man Jack \$35	1	1			2	70.00
Battery Charger \$200	1	1			2	400.00
Portable Battery Charger \$150	2	2		1	5	750.00
Radial Arm Table Saw \$350	1	1			2	700.00
HD Drill Press \$450	1	1			2	900.00
Welding Equipment: Arc 300 Amp. \$250	1	1			2	500.00
" " Acetylene \$250	1	1			2	500.00
Band Saw \$300	1	1			2	600.00
Hand Tools: Cable Saw \$70	1	1		1	3	210.00
" " 1/2" Drill \$75	1	1		1	3	225.00
" " 7" Circular Saw \$120	1	1		1	3	360.00
" " Misc. Hammers, Drills, Hack Saws blades	\$800	\$800		\$300	\$2400	2,400.00
Grinder \$150	1	1			2	300.00
A frame chain hoist \$120	1	1		1	3	360.00
Pipe Cutter \$50	1	1		1	3	150.00

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	<u>R</u>	<u>LL</u>	<u>M</u>	<u>AM</u>	<u>Total</u>	<u>Cost US\$</u>
Dies & threads \$300	1	1		1	2	600.00
Tire tools \$750	1	1			2	1,500.00
Gas-air Gun for vehicles \$100	1	1			2	200.00
Tool Chest \$200	1	1			2	400.00
Electricity Generator \$3500	1	1	1	1	4	14,000.00
Refrigerator \$700	3	3	1	1	8	5,600.00
Freezers \$700	2	2			4	2,800.00
Radio Telephone \$350	1	1	1	1	4	1,400.00
Tool Boxes \$25	1	1			2	50.00
Mechanic Tools \$400	1	1			2	800.00
Bench Vice \$200	1	1		1	3	600.00
Incubator 0°- 50°C. \$1,500	1	1		1	3	4,500.00
Autoclave \$1,200	1	1		1	3	3,600.00
Centrifuge \$500	1	1		1	3	1,500.00
Water Bath \$600	1	1		1	3	1,800.00
Muffle Furnace \$700	1	1		1	3	2,100.00
Vaccum Pump \$895	1	1		1	3	2,685.00
Electro Fishing gear for fixed on boat operation \$3500			1		1	3,500.00
Flame Photometer \$550	1	1			2	1,100.00
Salinometer \$600	1			1	2	1,200.00
					<u>Total</u>	<u>411,840.00</u>
					Estimated cost, freight and Insurance 10%	41,184.00
					Error in estimate 15%	<u>61,776.00</u>
					<b>GRAND TOTAL</b>	<b>514,800.00</b>

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TABLE 1.- REPELON STATION - PERSONNEL SERVICES

( 001. Persons )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Station Chief (1)	137,170	285,318	297,187	160,523
M.S. Level Biologist (1)	-	-	-	185,170
Biologists (3)	333,234	692,604	908,654	314,788
Economist (1)	11,078	230,868	259,281	120,591
Administrator (1)	-	80,753	88,645	47,916
Assistant Biologist (2)	-	148,975	128,172	87,120
Chofeuers (2)	-	76,230	82,764	44,867
Guards (3)	-	114,345	124,146	67,300
Specialized Laborers (3)	-	114,345	124,146	67,300
Laborer (7)	-	182,452	198,198	106,722
Boatmen (2)	-	84,071	91,476	53,539
Mechanic (1)	-	61,637	66,668	33,937
General Services (1)	-	80,136	27,374	15,246
Paymaster (1)	-	113,295	122,512	63,701
TOTAL	470,472	2,210,490	3,210,723	1,741,787

ANNEX 11  
Exhibit 2

TABLE 2.- MACANOME STATION - PERSONNEL SERVICES  
( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Station Chief (1)	137,214	225,318	302,187	160,083
Biologist (1)	111,075	230,862	302,885	157,395
Assistant Biologist (2)	74,482	155,074	167,706	87,120
Chofeur (1)	19,052	39,749	43,015	22,325
Guard (1)	-	38,115	79,497	41,382
Laborer (3)	-	78,402	81,675	42,471
Boatmen (2)	21,012	87,773	94,743	49,005
General Services (1)	-	13,062	27,225	14,157
TOTAL	362,856	928,373	1,104,933	573,938

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TABLE 3.- BLANCO STATION - PERSONNEL SERVICES  
( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Station Chief (1)	-	142,659	308,127	160,083
M.S. Level Biologist (1)	-	-	-	185,170
Biologists (2)	-	340,862	605,770	314,788
Administrator (1)	-	20,527	85,378	44,322
Assistant Biologist (3)	-	116,304	251,559	130,080
Chofeur (2)	-	39,749	86,031	44,649
Guard (3)	-	23,586	119,245	62,073
Economist (1)	-	57,717	249,381	129,591
Laborers (7)	-	45,738	190,575	99,099
Boatmen (3)	-	65,829	142,115	73,507
Mechanics (1)	-	15,410	64,142	33,323
General Services (1)	-	6,134	27,225	14,157
Paymaster (1)	-	27,324	122,513	63,707
TOTAL	---	981,248	2,292,129	1,355,149

TABLE 4.- ALTO MAGDALENA STATION - PERSONNEL SERVICES  
( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Station Chief (1)	-	142,659	308,187	160,523
Biologist (1)	-	--	302,885	157,395
Assistant Biologists (2)	-	38,768	167,706	87,120
Chofeur (1)	-	--	43,015	22,325
Guards (2)	-	--	79,497	41,382
Specialized Laborers (1)	-	--	43,016	22,324
Laborers (3)	-	--	29,318	45,738
Mechanic (1)	-	--	64,142	33,323
TOTAL	--	181,427	1,037,766	570,130

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TABLE 1.- REPELON STATION COST ESTIMATES BY YEARS

( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
Personnel Services	581,432	2,211,490	2,519,733	1,381,327	6,694,522
Maintenance and Insurance	-	400,000	450,000	300,000	1,150,000
Equipment Purchase	5,037,984	-	-	-	5,037,984
Travel and per diem	40,000	120,000	100,000	60,000	320,000
Communications	3,000	7,000	7,500	4,000	21,500
Public Services	8,000	17,000	17,000	9,000	51,000
Supplies and Materials	200,000	500,000	500,000	350,000	1,550,000
Publications	10,000	70,000	80,000	20,000	180,000
Purchase of land	-	-	-	-	-
Constructions	<u>3,640,000</u>	<u>4,644,000</u>	-	-	<u>13,284,000</u>
TOTAL	13,520,466	7,960,490	3,674,223	2,124,827	23,289,006

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TABLE 2.- ISLAND STATION - COST ESTIMATES BY YEARS  
( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
Personnel Services	362,856	628,373	1,104,333	373,938	2,970,100
Maintenance and Insurance	-	400,000	450,000	300,000	1,150,000
Equipment purchase	3,539,168	-	-	-	3,539,168
Travel and Perdiem	20,000	40,000	50,000	20,000	130,000
Communications	2,500	5,000	3,400	3,000	15,900
Public Services	-	-	-	-	-
Supplies and Materials	50,000	150,000	200,000	100,000	500,000
Publications	-	-	30,000	20,000	50,000
Purchase of land	150,000	-	-	-	150,000
Construction	624,000	324,000	-	-	648,000
<b>TOTAL</b>	<b>4,447,524</b>	<b>1,547,373</b>	<b>1,444,333</b>	<b>1,016,938</b>	<b>8,153,168</b>

TABLE 3.- LIABILITIES STATEMENT - COSA ESTIMATES BY YEARS

( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
Personnel Services	-	908,245	2,252,120	1,355,149	4,515,514
Maintenance and Insurance	-	908,245	700,000	400,000	1,100,000
Equipment purchase	-	5,609,728	-	-	5,609,728
Travel and Per diem	-	100,000	120,000	60,000	280,000
Communications	-	2,300	5,000	2,800	10,100
Public Services	-	-	-	-	-
Supplies and Materials	-	150,000	500,000	300,000	950,000
Publications	-	-	60,000	20,000	80,000
Purchase of land	-	500,000	-	-	500,000
Construction	-	5,400,000	4,325,000	-	9,720,000
<b>TOTAL</b>	-	<b>12,670,273</b>	<b>7,157,120</b>	<b>2,137,949</b>	<b>22,765,342</b>

TABLE 4.- ALTO MAGDALENA STATION - COST ESTIMATES BY YEARS  
( Col. Pesos )

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
Personnel Services	-	181,427	1,037,766	570,130	1,789,323
Maintenance and Insurance	-	-	100,000	80,000	180,000
Equipment purchase	-	2,780,248	-	-	2,780,248
Travel and Per diem	-	40,000	20,000	50,000	170,000
Communications	-	2,000	4,500	2,800	9,300
Public Services	-	1,500	3,000	2,000	6,500
Supplies and materials	-	50,000	200,000	150,000	400,000
Purchase of Land	-	300,000	-	-	300,000
Constructions	-	2,160,000	3,240,000	-	5,400,000
<b>Total</b>	-	<b>3,515,175</b>	<b>4,610,266</b>	<b>834,930</b>	<b>11,030,371</b>

TABLE 1.- CONTRACTS  
(Peso Cost Estimates)

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
University of Córdoba	100,000	400,000	100,000	100,000	700,000
University of Caldas	200,000	1,000,000	600,000	200,000	2,000,000
Cauca Valley Corporation	135,000	270,000	270,000	125,000	800,000
University of Valle	200,000	300,000	400,000	100,000	1,000,000
INCORA(Prod. Macrobrachium)	300,000	700,000	200,000	--	1,200,000
Other	100,000	300,000	300,000	150,000	850,000
TOTAL	1,035,000	2,970,000	1,870,000	675,000	6,550,000

TABLE I.- TRAINING - COST ESTIMATES

General Aquaculture	3 M.S.	120 m/h.	US\$ 108,000
Extension Aquaculture	4 M.S.	80 m/h.	72,000
Fishery Biology	3 M.S.	60 m/h.	54,000
Nutrition	2 M.S.	48 m/h.	43,200
Diseases	1 M.S.	24 m/h.	21,600
Fishery Marketing and Economics	2 M.S.	40 m/h.	36,000
	<u>17</u>	<u>372 m/h.</u>	<u>US\$ 334,800</u>

Includes: International Air Tickets, 6 week intensive English Course, tuition, per diem, insurance, etc.

Short Courses Abroad

1) Nutrition	6 m/h.	US\$ 7,200
2) Production	3 m/h.	4,000
3) Production	3 m/h.	4,000
		<u>US\$15,200</u>

Includes: International Air Tickets, training costs, insurance, per diem, etc.

Total Training Abroad US\$ 350,000

On-Country Training Estimates

20 Courses (1 month each) ... / ... US\$ 11,100

TABLE 2.- TENTATIVE PARTICIPANT TRAINING SCHEDULES M.S. LEVEL

	July 75	Jan.76	July 76	Jan.77	July 77	Jan.78	July 78
M.S. Aquaculture	[Timeline bar from July 75 to July 77]						
(1)	[Timeline bar from Jan.76 to July 77]						
(2)	[Timeline bar from July 76 to July 78]						
(3)	[Timeline bar from July 76 to July 78]						
(4)	[Timeline bar from July 76 to July 78]						
(5)	[Timeline bar from July 76 to July 78]						
M.S. Fisheries Extension	[Timeline bar from Jan.76 to July 77]						
(6)	[Timeline bar from Jan.76 to July 77]						
(7)	[Timeline bar from Jan.77 to July 78]						
(8)	[Timeline bar from Jan.77 to July 78]						
(9)	[Timeline bar from Jan.77 to July 78]						
M.S. Fisheries Biology	[Timeline bar from Jan.76 to July 77]						
(10)	[Timeline bar from July 76 to Jan.78]						
(11)	[Timeline bar from July 76 to Jan.78]						
(12)	[Timeline bar from July 76 to Jan.78]						
M.S. Fish Nutrition	[Timeline bar from Jan.76 to July 77]						
(13)	[Timeline bar from July 76 to July 78]						
(14)	[Timeline bar from July 76 to July 78]						
M.S. Fisheries Econ. & Mgmt.	[Timeline bar from Jan.77 to July 78]						
(15)	[Timeline bar from Jan.77 to July 78]						

TABLE 1.- TECHNICAL ASSISTANCE COST ESTIMATE

90 mm of full time technicians at US\$ 5,500/m.m. including overhead, housing, per diem, etc.	\$ 495,000
20 mm of short-term consultants at US\$ 4,000/m.m. including international travel, per diem, etc.	\$ 80,000
	<hr/>
Total	\$ 575,000
Rounded to	\$ 580,000

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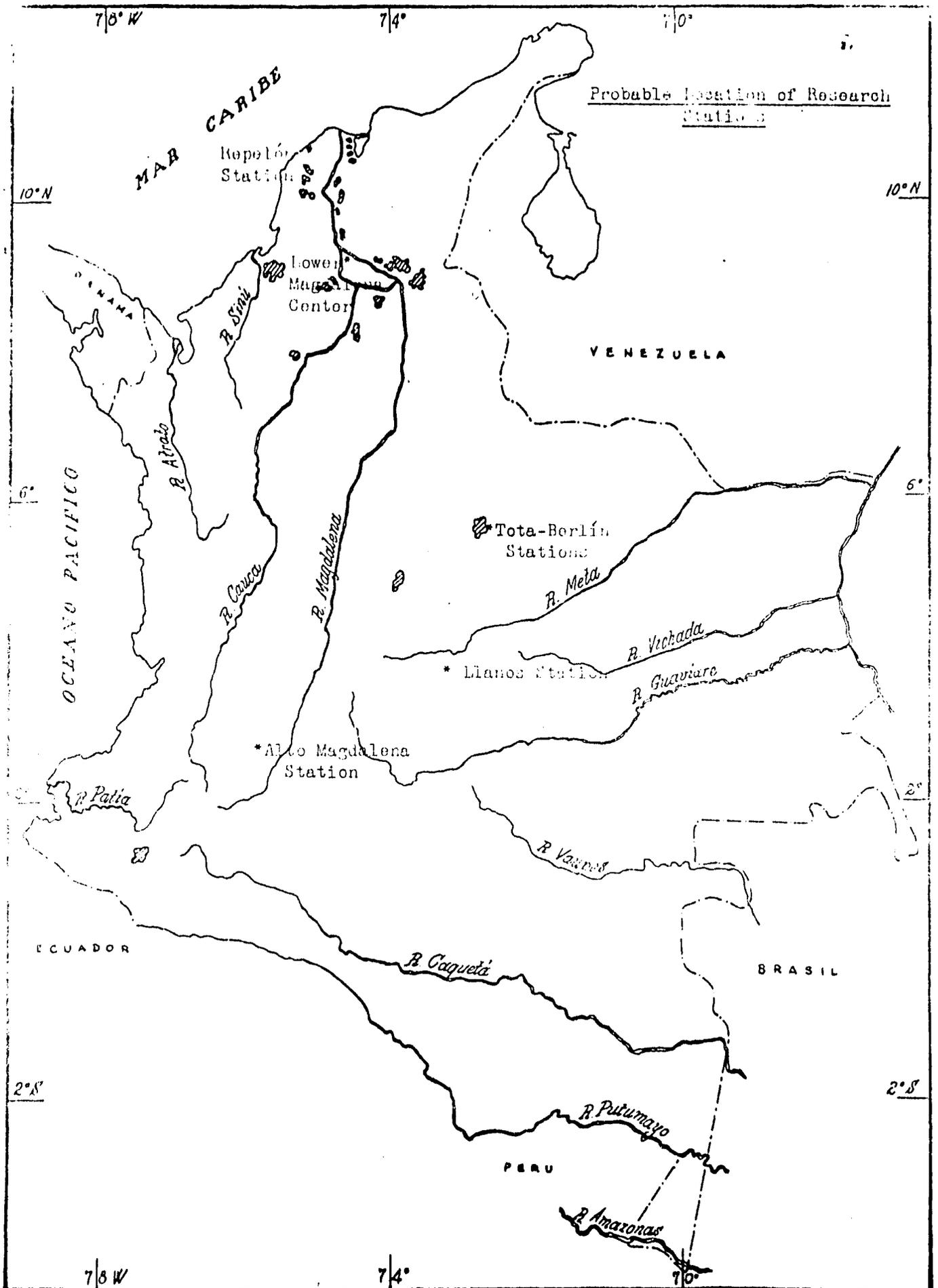
ANNEX II  
Exhibit 6

ANNEX II, Exhibit 7

CONSTRUCTION AND RESEARCH TENTATIVE SCHEDULE

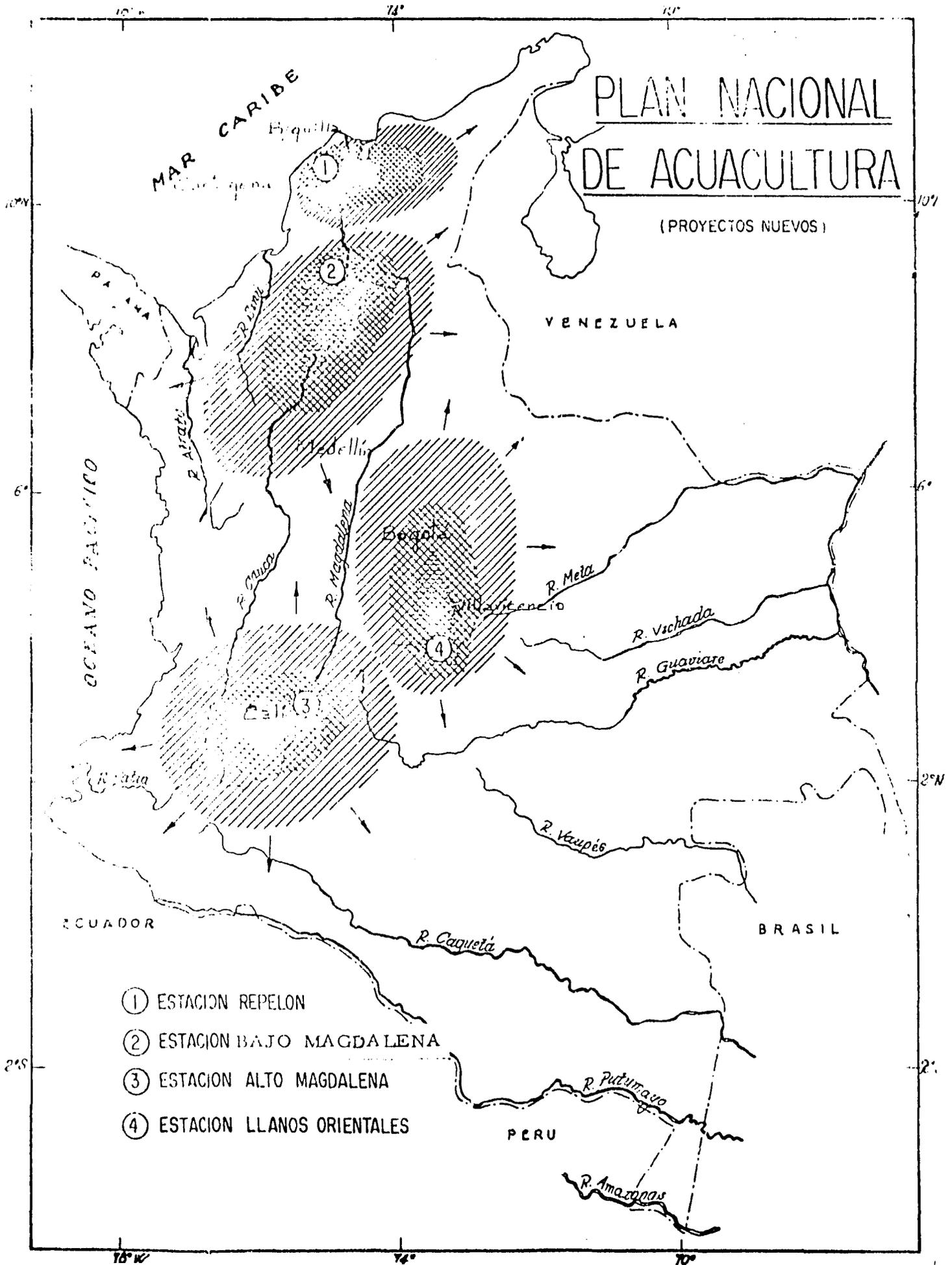
Loan Disbursement Period	T.D.D.												1980	1981	1982		
	1975 3rd.Qtr.	1975 4th Qtr.	1976 1st Qtr.	1976 2nd Qtr.	1976 3rd Qtr.	1976 4th Qtr.	1977 1st Qtr.	1977 2nd Qtr.	1977 3rd Qtr.	1977 4th Qtr.	1978 1st Qtr.	1978 2nd Qtr.				1978 2nd Str.	
<u>Repelón Station</u>																	
Construction																	
Research																	
Technical Package																	
<u>Lower Magdalena Center</u>																	
Site Location																	
Construction																	
Research																	
Recommendations																	
<u>Janos Station</u>																	
Site Location																	
Construction																	
Research																	
Technical Package																	
<u>Alto Magdalena</u>																	
Site Location																	
Construction																	
Research																	
Technical Package																	
<u>Technical Assistance</u>																	
Aquaculture/Farm Mgmt.																	
Aquaculture/Station Mgt.																	
Lake & River Mgt.																	

Initially the two Aquaculture Technicians will be located at the Repelón Station; one of them will be shifted to the Alto (Upper) Magdalena Station in the 2nd quarter of 1977.



# PLAN NACIONAL DE ACUACULTURA

(PROYECTOS NUEVOS)



- ① ESTACION REPELON
- ② ESTACION BAJO MAGDALENA
- ③ ESTACION ALTO MAGDALENA
- ④ ESTACION LLANOS ORIENTALES

DAEC Instruction Cable

Paragraph A:

Paragraph A of the DAEC Instruction Cable is covered in Section I A. Project Rationale and in Section I B. Background.

Paragraph B:

Paragraph B of the DAEC Instruction Cable is covered in Section I-A 2. The Project Purposes, Section II Project Description and Section VI D Evaluation.

Paragraph C and D:

Paragraphs C and D of the DAEC Instruction Cable is covered in Section I B - Background.

Paragraph E:

Paragraph E of the DAEC Instruction Cable is covered in Section I A 4, The Proposed Strategy and Section V E, The Role of Women .

Paragraph F:

Paragraph F of the DAEC Instruction Cable is covered in Section IV Financial Plan and Annex I, Exhibits 4, 5 and 6.

Paragraph G:

Paragraph G of the DAEC Instruction Cable is covered in Section VI D, Evaluation.

Paragraph H:

Paragraph H of the DAEC Instruction Cable is covered in Section II, Project Description.

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