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Project Paper Outline

Aquaculture Technology Development and Assistance

PROJECT PAPER

FOR

A COOPERATIVE AGREEMENT

WITH

THE INTERNATIONAL CENTER FOR AQUACULTURE

AT

AUBURN UNIVERSITY

Renewable Natural Resources Division
Office of Agriculture
Bureau for Science and Technology

PROJECT PAPER
FOR A FIVE YEAR EXTENSION

Project Title: Aquaculture Technology Development
Project Number: 931-1314

CURRENT OBLIGATING DOCUMENTS

<u>Document Type</u>	<u>Number</u>	<u>Total Cost</u>	<u>Effective Dates</u>
Core Support Grant	DSAN-G-0039	\$1,102,160	8/30/78 to 12/31/81
<u>Tech. Assistance Contract</u>	DSAN-C-0053	339,200	9/15/78 to 12/31/81
Sub-Total		<u>\$1,441,360</u>	

PROPOSED FIVE YEAR EXTENSION

Cooperative Agreements	NA	\$2,250,000	1/1/82 to 12/31/86
<u>Indepth Team Evaluations</u>	(2)	<u>50,000</u>	
Sub-Total-5 yr Extension		<u>\$2,300,000</u>	
Grand Total Life-of Project		\$3,741,360	8/30/78 to 12/31/81

IMPLEMENTING AGENT-(Past and Proposed): The International Center for
Aquaculture (ICA) at Auburn University

A.I.D. PROJECT MANAGEMENT:

Project Manager: Norman Pease (Tel: 235-1275)
Office/Division: S&T/AGR/RNR

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE

A ADD
 C CHANGE
 D DELETE

PP

2. DOCUMENT CODE

3

3. COUNTRY/ENTITY S&T/AGR/RNR
 Type C. Field Service

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5. PROJECT NUMBER (7 digits)

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8. ESTIMATED FY OF PROJECT COMPLETION

FY

9. ESTIMATED DATE OF OBLIGATION (for 5 yr extension)

A. INITIAL FY B. QUARTER
 C. FINAL FY (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) - (For 5 year extension)

A. FUNDING SOURCE	FIRST FY 1982			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	360	-	360	2,300	-	2,300
(GRANT)	(360)	(-)	(360)	(2,300)	(-)	(2,300)
(LOAN)	()	()	()	()	()	()
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY						
OTHER DONOR(S)						
TOTALS	360	-	360	2,300	-	2,300

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E Thru 9/31/81		M. 1st FY 82		K. 2nd FY 83	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) ARDN	149I	077	-	1,459	-	360	-	425	-
(2)									
(3)									
(4)									
TOTALS				1,459	-	360	-	425	-

A. APPROPRIATION	N. 3rd FY84		O. 4&5-FY85-86		LIFE OF PROJECT		12. IN-DEPTH EVAL- UATION SCHEDULED
	D. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1) ARDN	440	-	1075	-	3,759	-	<input type="text" value="07"/> <input type="text" value="83"/>
(2)							
(3)							
(4)							
TOTALS	440	-	1075	-	3,759	-	

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 = NO
 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE
 TITLE
 Donald R. Fiester
 Director, Office, of Agriculture-S&T/AGR

DATE SIGNED

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

PROJECT PAPER

TABLE OF CONTENTS

Page

I. SUMMARY AND RECOMMENDATIONS	
A. Recommendations	1
B. Summary Description	1
1. Institutional Capacity Development-Core Support	1
2. Outreach Activities in the LDCs-Advisory Service	3
II. PROJECT BACKGROUND AND DETAILED DESCRIPTION	
A. Background	5
B. Detailed Description	6
1. Introduction	6
2. Sector Goal	7
3. Project Purpose	7
4. Project Outputs	8
5. Project Inputs	9
6. Logical Framework	11
III. PROJECT ANALYSIS	
A. Technical Analysis	12
B. Environmental Impact	16
C. Financial Analysis	19
1. Input Budget	21
2. Output Budget	22
D. Social Analysis	23
E. Economic Analysis	25
F. Women in Development	28
IV. IMPLEMENTATION ARRANGEMENTS	
A. Analysis of Administrative Arrangements	29
B. Implementation Plan	29
C. Evaluation Plan	29
D. Project Reporting	30
E. Related Activities of Other Donors	30
F. Scope-of-Work	31
V. ANNEXES	
A. Sources of Funding of ICA 1977-78 thru 1980-81	35
B. List of Short Term ICA Foreign Assistance	36
C. List of LDC Students Trained at ICA: 1977-81	41
D. List of ICA Research and Development Publications	48
E. Comparison of Contract Activities for FY1979 and 1980	50

PART I SUMMARY AND RECOMMENDATION

A. RECOMMENDATION

It is recommended that a \$2,250,000 Cooperative Agreement be approved for a five-year period to assist Auburn University's International Center for Aquaculture (ICA) in the development, refinement and maintenance of a technical capability in the field of aquaculture and to provide for the use of such capability in the development of programs in aquaculture in the LDCs. The Cooperative Agreement will facilitate the continuity of the University's education program for LDC students in aquaculture and will make technical assistance available to USAID Missions and host government institutions for fisheries outreach programs. Other outputs which the project will generate are special short courses for LDC students both on the Auburn Campus and in the LDCs, an expanded information system to assemble pertinent information and exchange it with aquaculture and fisheries centers in cooperating countries, the preparation and publication of pertinent scientific and farmer-type bulletins, and the generation of basic and developmental research to increase pond fish production at reduced cost. A Cooperative Agreement mode is proposed. The Cooperative Agreement would be initially funded with \$360,000 in FY82. Funding levels for FY'83, '84, '85 and '86 will be \$400,000, \$440,000 \$500,000, and \$550,000, respectively. An additional \$50,000 for this project extension will be provided for two in-depth team evaluations to be conducted in FY83 and '85.

B. SUMMARY DESCRIPTION

The ICA constitutes the international component of the Auburn University Department of Fisheries and Allied Aquacultures. As seen in Annex A, AID is contributing only approximately 25 per cent of the Department's budget. This is used exclusively for activities related to the international program. State and Federal funds are employed to provide facilities for training US students in aquaculture, for research on fish farming for the United States and for a large extension program carried out with fish farmers in the State of Alabama. The international component, ICA, is built onto the State and Federal construction and thereby benefits from their resources at no additional cost.

The Cooperative Agreement will have two major areas of concentration. These are: (1) to improve the institutional capacity of the ICA to provide the developing world technical assistance in dealing with matters related to increased fish production in man-made ponds and surface waterways; and (2) the actual application of ICA's expertise through outreach programs in the LDCs.

1. Institutional Capacity Development - Core Support

To improve its institutional capacity, ICA will;

a. Expand its program for training LDC technicians in the latest scientific methods for raising fish in ponds;

b. Retain a staff of highly specialized aquaculture experts prepared to provide technical assistance in fish culture upon the request of USAID Missions and participating LDCs. In addition, ICA will draw on the resources of the Department of Fisheries and Allied Aquacultures.

c. Increase its library facilities accumulating pertinent literature with which to expand its information service.

d. Initiate and continue applied and adaptive research concerned with the production of increased quantities of pond fish at reduced cost under small farm conditions.

Details of these four areas of activities are outlined below:

a. Training. Under this Cooperative Agreement ICA will provide facilities for the instruction of LDC students of a type which neither the state of Alabama nor the federal government can nor should be expected to provide. A high degree of faculty involvement will be utilized in graduate degree and special training. Extra tutorial services will be provided to assist the foreign students to keep up in their work. Courses in tropical aquaculture which are not a normal part of the fisheries curriculum will be offered for the LDC students' special benefit. The ICA will maintain adequate facilities in its laboratories and special research ponds at its field station for the use of the LDC student body.

It will maintain openings for up to thirty-five (35) LDC graduate students to study at any one time in the Department of Fisheries on the Auburn Campus.

It will provide a four month short course each year in practical aspects of fish production for up to twenty-five (25) special students who either occupy or will occupy responsible positions as officers in the fisheries programs of their respective countries.

It will arrange special training between academic quarters and during vacations and provide travel opportunities for LDC students to observe and study elements of aquaculture in other regions which will complement their training at Auburn.

b. Retention of Special Staff to Provide Technical Assistance. The Cooperative Agreement will allow ICA to provide forty (40) person months of senior professional staff time to matters related to LDC fisheries development both on campus and in the field. Particular attention will be given to preparing these staff for their assignments overseas. Special studies such as language training, area studies and participation in related conferences and workshops may be funded from the AID cooperative agreement.

c. Information Services In addition to improving the ICA library facilities for students on the Auburn campus, the Cooperative Agreement will facilitate the following components.

(1) The ICA Information Service will be expanded to offer a broader data base from which to provide responses to specific questions from USAID Missions and LDCs.

(2) Information and training materials including instructional information and reference material will be developed and made available to AID, cooperating countries and students. To the extent possible this information will be produced in English and Spanish and may be translated to Portuguese and French.

(3) At least two (2) special farmer-type bulletins and/or training manuals will be prepared in pertinent fields of fish culture each year.

(4) A quarterly newsletter containing information on recent developments in fish culture and appropriate new technologies for LDC fish production will be printed and distributed four times a year. At least five hundred (500) copies will be made available to interested parties, no less than half in the LDCs.

d. Research. ICA will concentrate its research efforts on investigations appropriate to small farm fish production, particularly as related to tropical conditions in the LDCs. Up to thirty six (36) person-months of graduate and research assistantships will be provided each year for promising students to study and undertake investigations in aquaculture development. Appropriate topics may include, but are not limited to the following:

(1) Genetic manipulation of tilapia species for more rapid growth, more efficient food conversion and improved physical characteristics.

(2) Interspecific hybridization for the development of unisexual progeny.

(3) Polyculture to reduce overpopulation and increase total fish harvest.

(4) Fish/small animal associations for dual purpose animal production and economy of energy utilization.

(5) Development of low cost fish feeds.

(6) Post harvest fish processing.

2. Outreach Activities in LDCs - Advisory Service

The second major area of concentration of the Cooperative Agreement will be Auburn's outreach program overseas which has three basic components:

a. In-country training activities.

b. Technical assistance to USAID Missions and host country LDCs upon request, and

c. Long-term activities at mission expense.

Details of these three areas of activities are outlined below:

(1) Training programs. As part of its overseas education program ICA will provide two (2) short courses in FY 1982. It will be equipped to provide additional short courses, special seminars and workshops at mission request when mission funded.

(2) In-country Technical Assistance. The recipient will undertake short-term assistance under this program at the request of USAID Missions. Travel costs of specialists in most cases will be borne by missions. Special teams will be assigned to focus on specific aquaculture problems for short periods of time not to exceed thirty (30) calendar days per mission year. Up to sixteen (16) months of ICA specialists' time will be made available for these services in 1982 and each year of the Cooperative Agreement thereafter. Additional technical assistance beyond the thirty day limit will be provided by the ICA as staff is available, when missions so requests and pays for the additional service. Assistance may include, but is not restricted to:

(a) Feasibility and pre-feasibility studies leading to the development of possible aquaculture projects.

(b) Specific recommendations on pond culture, brood stock production, pond management, agribusiness projects designed to assist small fish producers, environmental assessment, fish and feeding and evaluation of technical studies and proposals.

(c) Impact evaluations in the design, implementation and follow through of mission funded and host country aquaculture activities.

(d) Identification of special problems and potential means of resolving such problems as they relate to LDC fish farming and the stocking of surface waterways.

(3) Long term activities at Mission expense. When possible ICA will provide long term assistance for mission funded aquaculture projects or loan funded activities supported by AID and other donor agencies. Such assistance will be funded by special contractual agreements between the requesting Mission and ICA.

It is expected that core support for this project will be required on a long-term basis which, it is believed, can best be provided under the Cooperative Agreement mechanism. The Advisory Services Activity, formerly funded under Contract AID/DSAN-C-0053 will be allowed to terminate along with Grant AID/DSAN-G-0039 on December 31, 1981. Subsequently, the Cooperative Agreement, with components for merging support under the two former funding agreements, will be implemented January 1, 1982, as a single funding document.

PART II PROJECT BACKGROUND AND DETAILED DESCRIPTION

A. BACKGROUND

Aquatic food production differs from that of other commodities in that a majority of the total supply presently comes from wild stocks. The realization of the potential contribution of aquaculture to total supplies of fish and other aquatic foods is just beginning to materialize. Aquaculture production, which presently provides about 10% of the world supply of aquatic food, increased from one million metric tons in 1966 to 6.1 million tons in 1975. Aquaculture development plans prepared by 34 developing countries in Africa, Asia and Latin America plus production increases occurring in other countries are expected to result in a total production of 12 million tons by the end of 1985. Experts agree that potential for much greater production exists, and that aquaculture can be complementary to traditional agriculture by utilizing land resources of low value, water resources stored for irrigation, power, or flood control, and agricultural labor whose regular employment is seasonal.

Basic technology for labor intensive aquaculture production already exists. This technology has been used successfully in a variety of circumstances. The efficiency of fish production in ponds and the utilization of organic wastes as fertilizers and agricultural by-products as supplemental feeds greatly reduces the costs of inputs. Energy requirements for such systems are relatively low and the financial rates of return are generally attractive. These characteristics make aquaculture well suited for developing countries.

The International Center for Aquaculture (ICA) at Auburn in 1980 had 95 graduate students enrolled in the fisheries curriculum of which 35 were of foreign nationality. In addition 18 foreign nationals were enrolled in the four-month intensive aquaculture training program. The majority of foreign graduate students are sponsored by various international organizations, including FAO, USAID, World Bank, Rockefeller Foundation and IDRC (Canada). Other international students are sponsored by research organizations in their home countries, i.e. MARDI (Malaysia), KISR (Kuwait) and INDERENA (Colombia). US universities and consortia, MUCIA (Wisconsin), SECID (Southeastern Consortium for International Development) and Kansas State University, financially support several of Auburn's international students.

Auburn has joined the Latin American Scholarship Program (LASPAU) in sponsoring graduate students drawn from staffs of Latin American universities. In 1980 three LASPAU students (one each from Venezuela, Peru and Colombia) were enrolled in the fisheries graduate program, with tuition paid by Auburn's fisheries department.

Auburn personnel have assisted in long-term aquaculture development projects in the Philippines, Jamaica, Indonesia, Honduras, Colombia, Brazil, El Salvador, Panama and Nigeria. A total of 65 person-years of long-term advisory services have been contributed to those projects. From September 1978 to June

1980, Auburn staff members responded to 66 requests for short-term assistance and provided 840 man days of services to 33 LDC and middle income countries.

This contribution of Auburn to LDC aquacultural development has been possible because of the core support provided through previous AID grant funding. Eleven years ago Auburn had 2 full-time and 2 part-time professors on their fisheries staff. In June 1980 their staff and faculty had grown to 55, of which 26 have overseas experience. The full time graduate program enrolls up to 35 students from LDCs per school year. A four month intensive aquaculture training program is offered annually for up to 25 special participants from LDCs. They are given over 300 hours of lecture, laboratory and field training and a two week tour of aquaculture facilities in a five state area. AID core support has helped to alleviate the heavy financial burden placed on Auburn University as a result of the large proportion of the staff involved with international aquaculture development. Without this support from AID to supplement that provided by the State of Alabama, it would not be possible to maintain existing capabilities and to fully utilize the expertise developed to provide overseas technical assistance.

In an AID review of the Auburn project undertaken February 11-13, 1980, the review team pointed out the need for long-term core support and recommended that AID continue this assistance for the effective utilization of the expertise developed to assist Missions and LDCs in aquaculture.

The proposed Cooperative Agreement will extend over a five-year period; however, it is anticipated that the need for support to maintain and expand Auburn's capabilities will continue beyond this five-year period. Some state and federal funds are available to support Auburn University in its work related to the US aquaculture and sport fisheries industries, but for the most part these services are not available for development assistance to LDCs, nor should that be expected. This then is what Auburn University proposes to undertake at its International Center for Aquaculture.

B. DETAILED DESCRIPTION

1. Introduction

The Cooperative Agreement is contemplated to replace the assistance which AID has provided for the development and maintenance of the International Center for Aquaculture (ICA) at Auburn University over the past 11 years. From June 1970 until May 1978 financial assistance was provided by means of the 211(d) mode, Grant AID/DSB-2780. When it was realized that it would not be possible to sustain Auburn's international response capability without continued AID contribution to the core budget of the ICA, it was first proposed to extend the AID support by means of an additional 211(d) grant. This, however, was considered to be inappropriate by the Office of the AID General Counsel as the 211(d) mode was for developing a foreign assistance capability, not for core support. It was pointed out that at Auburn University such a response capability already existed. The counselors also questioned the propriety of providing technical assistance to LDCs under an AID grant. For those reasons two separate project components were approved in 1978 for continuing support

of the program at Auburn. These were: 1) a grant (AID/DSAN-G-0039), which provides core funding for the education and outreach activities of the ICA on the Auburn Campus; and 2) a Contract (AID/DSAN-C-0053), under which technical assistance is made available to LDCs at the request of the USAID Missions. After 11 years in which AID dealt through the International Center as its representative, it is intended now to set the ICA up independent of AID. Auburn would like, through a Cooperative Agreement, to provide the LDCs much the same type of assistance which AID had done with ICA as its agent in the past.

NOTE: The outline of the Cooperative Agreement is shown in the logical framework on page 11 and is detailed in the narrative description below.

2. Sector Goal.

The sector goal is to improve the capacity of small farmers to produce high protein food in LDCs through the farming of fish and the controlled stocking of inland water bodies.

The success of aquaculture programs in producing an economic source of animal protein through pond culture has already been demonstrated in a number of LDCs. As a consequence, interest in fish farming has steadily increased. That there is a need for short- and long-term technical services in this field is evidenced by the large demand for ICA's services at Missions' request. Auburn aquaculture technicians have provided a total of 65 person-years of long-term advisory services under seven USAID Mission and three host country contracts. Short-term technical services were provided by individual ICA staff who contributed a total of 6,025 person-days of overseas work in which 343 country visits were made in 76 different countries during the period 1967-1980. There is every reason to assume, as a result of continued outreach made possible with Auburn University assistance, that fish farming can become a profitable enterprise for large numbers of small-scale farmers in many LDCs.

3. Project Purpose

AID's continued support of the core budget of the International Center for Aquaculture is expected to maintain the facility which has been developed at Auburn over the past 11 years. The project purpose is: to enable ICA to utilize this facility to continue strong educational programs in fish culture for students from LDCs; to more effectively utilize the capabilities available at Auburn in programs which will backstop aquacultural development in the LDCs; and to research, develop and extend appropriate new technology in fish culture to USAID Missions and host country governments.

The strong influence which ICA has exerted in the development of aquaculture in LDCs is to a great extent the result of the students it has trained in tropical aquaculture. It is noteworthy that many have returned to their home countries to occupy key positions in their agricultural and fisheries departments. The teaching staff has had many years of experience working in LDCs and this has created an intimacy between the foreign student body and the Auburn faculty which is unique. Due to the unusually high number of professional staff which have participated in international development programs, ties are formed with the foreign students which remain long after

the students have returned to their home countries. ICA has been effective in drawing on these ties to establish a network for implementing aquaculture activities in the LDCs. The network adapts the technologies developed in the US by the university community and state and federal agencies to the particular needs of the LDCs. This ICA network also provides an institutional set-up for a post-consultation "follow-through" and information exchange. Finally by making use of its network contacts the ICA staff has been able to achieve, during short periods of consultation, project success that would require most contractors considerable time to achieve.

4. Project Outputs

Up to 35 LDC graduate students will be enrolled in formal courses in aquaculture and fisheries at Auburn each year to prepare for leadership roles as teachers, researchers or administrators in LDCs. Individual farmers, extension personnel, and aquaculture workers will receive practical training in aquaculture through short courses or extension programs. Technical assistance will be provided to LDC institutions and mission personnel as well as to fish farmers as a part of the technology transfer process. A developing international network of universities, research institutions, and agencies working together in the field of aquaculture will be strengthened through project activities. New technologies developed for increasing fish production at reduced costs will be adapted to the tropical conditions of most LDCs. Specific identifiable outputs will be:

a. Basic educational program. A strong graduate educational program will be maintained at Auburn with orientation toward application of aquaculture in the LDCs. Positions for up to 35 graduate students from LDCs will be maintained each year.

b. Special training and graduate student assistantships. Special training for up to 20 foreign students, including visits to fish farms and other fisheries institutions, will be provided between quarters and during holidays to broaden their experience and knowledge in aquaculture. Each year selected graduate students from LDCs will be awarded a total of 36 months of assistantships which will enable them to complete academic research and thesis programs that constitute important parts of their education.

c. Short courses. A four-month intensive aquaculture training program will be offered annually for up to 25 LDC participants. This training will include practical experience and instruction in the most important aspects of aquaculture including pond construction, hatchery management, fish production, pond management, nutrition, disease control, water quality and product processing.

d. Publications and manuals. Each year at least two working manuals for use in LDCs will be prepared on topics such as aquaculture research, hatchery management and extension methods. A quarterly information letter on new aquacultural and technical innovations will be published and distributed to former students and to other interested persons. A variety of reports will be published describing the progress made in the development of aquaculture by Auburn personnel working in LDCs. Initially all publications will be in English and will be written for research biologists, extension leaders,

students, and instructors. Translations to Spanish, French and other languages will be made as appropriate, especially of materials used by extension workers. Other information services will be provided as requested and feasible.

e. Short courses and seminars in LDCs. As part of the continuing education program, Auburn will provide short-courses and seminars to fish farmers and to university and government personnel on applied aspects of aquaculture and inland fisheries. Under this project at least one course will be presented to a LDC in 1982, one in 1983, and at least one each year thereafter. Additional courses will be available if funded by AID Missions or with non-project funds. Among the proposed sites for these initial short-courses are Colombia, Egypt, El Salvador, Guatemala, Indonesia, Jamaica, Philippines, Thailand and selected countries of West Africa. Final site selection will be made on the basis of interest and needs of the host-country fisheries department or agencies.

f. Technical assistance to LDCs. Up to 16 months of personnel time will be provided for evaluations of LDC aquaculture development programs and short-term advisory services in each year of the agreement thereafter. The International Center for Aquaculture will respond to additional requests from USAID Missions or the Regional Bureaus for technical assistance in aquaculture and inland fisheries at their cost.

5. Project Inputs

The cost of this activity over a 5-year period will be approximately \$2,250,000. The project is scheduled to start on January 1, 1982, with annual budgets of \$360,000, 400,000, 440,000, 500,000 and 550,000 are proposed for 82, 83, 84, 85 and 86 respectively. In-depth project reviews (\$25,000 each) will be scheduled on the second and fourth anniversaries of project implementation. The review will serve two functions: first, as a vehicle through which to audit the rate of project expenditures; and second, to consider any internal adjustments that should be made in the project operations. At the fourth year evaluation it will also be determined if adequate developmental benefit has been achieved by the International Center for Aquaculture and the LDCs, to merit extension of the Cooperative Agreement beyond the fifth year.

a. Inputs in support of on-campus activities (Core Support) on a yearly basis at current costs (initial year of the extension) are estimated as follows:

(1) Forty (40) person-months of professional time for LDC student training, information development and supervision of graduate student research.	\$105,210
(2) Administrative, secretarial and non-professional support.	11,720
(3) Thirty-six (36) person-months of graduate student assistantships and graduate research.	30,910

(4) Equipment and supplies in support of laboratory and research activities.	7,470
(5) Travel support to attend meetings, conferences and workshops in support of the technical assistance program.	9,340
(6) Library acquisitions.	1,870
(7) Publications and Printing.	<u>8,680</u>
TOTAL	\$175,200

b. Inputs in support of the overseas outreach program (Advisory Services) at current costs for one year.

(1) Sixteen (16) person months of professional services to provide technical assistance, no more than thirty (30) days, at cost to the project.	44,000
(2) Staff services including travel, supplies, medical exams and communications	22,000
(3) Administrative cost.	3,600
TOTAL	69,600
(c) Overhead (28% of total modified direct cost)	72,470
(d) Fringe benefits (25% of salaries excluding graduate assistantships)	<u>42,730</u>
TOTAL	\$360,000

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project: 4 years 8 months
From FY May 1981 to FY 1985
Total U.S. Funding \$2,020,000
Date Prepared: March 11, 1981

Project Title & Number: Aquaculture Technology Development and Assistance

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																													
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>The goal of this project is to improve the quality of life for low income people through increasing the protein available to them by increasing the production of fish in the less developed countries. The sub-goal is to meet the protein needs of low income people.</p>	<p>Measures of Goal Achievement:</p> <ol style="list-style-type: none"> The area in pond production will continue to increase at a rate of approximately 2% a year in countries where pond culture is practiced. Fish from farmed ponds and stocked waterways will continue to be increasingly available in countries where pond culture is a national program. 	<ol style="list-style-type: none"> FAO statistics on aquaculture production. a) National production statistics. b) Records of pond fish sales in areas of inland fish production. 	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> a) Fish can be economically raised in ponds and stocked waterways. b) Most countries desire to implement fish culture. 2.a) Fish are an acceptable source of animal protein and one consumed by the poor. b) The resources needed for aquaculture production are available: i.e., land, labor, surface water and organic wastes. 																																													
<p>Project Purpose:</p> <p>The purpose of the project is to utilize the capabilities of the International Center for Aquaculture at Auburn University in the development of institutional capacities in LDCs and USAIDs to analyze problems and improve national ability to increase fish production in man-made ponds and other waterways.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> Educated fish culturists will return to LDCs from Auburn. A strong network between Auburn and its alumni will continue to provide LDC aquaculture personnel with manuals and printed materials and the appropriate technology and technical assistance required to accelerate aquaculture production in their home countries. 	<ol style="list-style-type: none"> Up to 36 graduate students and 25 short course students trained in aquaculture and returning to the LDCs each year. a) AID biennial reviews. b) Auburn University records. c) Observation of new technologies implemented in the LDCs. 	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> USAIDs and host countries will continue to send students to Auburn for training. US trained aquaculturists will have local support in their home countries. That the new technology implemented is applicable and that when required the USAIDs or host government will request the US technical assistance required to backstop their local technicians. 																																													
<p>Outputs:</p> <ol style="list-style-type: none"> Core support on campus: (a) LDC students trained at the graduate level. (b) LDC special students trained at 4 mos practical short course. (c) Special workshops. (d) LDC student assistantships. (e) Newsletter. (f) Working manuals. Advisory or technical assistance services: (a) Short courses provided in LDCs at project expense. (b) Evaluations of aquaculture development programs. (c) Short-term advisory services. 	<p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> (per year): (a) Up to 35 students. (b) Up to 25 students. (c) 4 workshops. (d) 36 person mos. (e) 4 issues. (f) 2 manuals. (per year): (a) At least 2 (4 person mos of Auburn staff time). (b) Up to 6 (2 person mos of Auburn staff time). (c) Up to 10 person mos of Auburn staff time. 	<ol style="list-style-type: none"> University records and reports to AID. Overseas technical assistance will be provided only upon Mission or LDC request and all foreign travel must first be cleared through AID. 	<p>Assumptions for achieving outputs:</p> <ol style="list-style-type: none"> Past performance of Auburn LDC training will be maintained. a) USAIDs and LDCs will request Auburn technical assistance. b) Existing technology is suitable for LDC use and can be transferred. 																																													
<p>Inputs:</p> <ol style="list-style-type: none"> Core support on campus (one year) <ol style="list-style-type: none"> 40 professional mos/yr on LDC student training. Non-professional support personnel 36 person mos/yr graduate research assistantships. Equipment and supplies. Travel Library acquisitions. Publication and printing. Advisory or technical assistance services (one year). <ol style="list-style-type: none"> 16 person mos/yr T.A. services overseas. Staff services. Administrative costs. Overhead (28% of salaries). Fringe benefits (25% of salaries excluding graduate assistantships). <p align="center">Grand Total</p>	<p>Implementation Target (Type and Quantity)</p> <table border="0"> <tr><td>a)</td><td>\$105,210</td><td></td></tr> <tr><td>b)</td><td>11,720</td><td></td></tr> <tr><td>c)</td><td>30,910</td><td></td></tr> <tr><td>d)</td><td>7,470</td><td></td></tr> <tr><td>e)</td><td>9,340</td><td></td></tr> <tr><td>f)</td><td>1,870</td><td></td></tr> <tr><td>g)</td><td>8,680</td><td></td></tr> <tr><td></td><td></td><td>\$175,200</td></tr> <tr><td>a)</td><td>44,000</td><td></td></tr> <tr><td>b)</td><td>22,000</td><td></td></tr> <tr><td>c)</td><td>3,600</td><td></td></tr> <tr><td></td><td></td><td>\$19,600</td></tr> <tr><td></td><td></td><td>\$ 72,470</td></tr> <tr><td></td><td></td><td>\$ 42,730</td></tr> <tr><td></td><td></td><td>\$360,000</td></tr> </table>	a)	\$105,210		b)	11,720		c)	30,910		d)	7,470		e)	9,340		f)	1,870		g)	8,680				\$175,200	a)	44,000		b)	22,000		c)	3,600				\$19,600			\$ 72,470			\$ 42,730			\$360,000	<p>Accounting and contract records as reported to AID Office of Financial Management.</p>	<p>Assumptions for providing inputs:</p> <p>That the aquaculture program at Auburn will continue to be supported with state and federal funds so that AID, at a correspondingly reduced cost, may build an international assistance thrust onto the available facilities.</p>
a)	\$105,210																																															
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PART III PROJECT ANALYSIS

A. TECHNICAL ANALYSIS

Aquaculture provides a great potential for increasing the food supply in LDCs by using underutilized labor and land resources, available waste products and water being stored for other purposes. It is now possible to point to substantial production of high quality protein from aquaculture and to a series of examples of economically viable, efficient, and practical fish production systems operating in developing countries.

Mainland China is the leader in both aquacultural production and in the recycling of wastes through aquaculture. Multiple uses of water and the use of multispecies, ecologically balanced systems with efficient, herbivorous fishes are widespread. A recent FAO study team observed a major commitment to the storage of water for conservation and irrigation, and for concurrent use of stored water for fish culture. Spawning, hatchery and rearing methods are some of the most developed in the world, and are being practiced at the community level with outstanding success. China's success in aquaculture, with an annual production of 2.5 million tons, is a convincing demonstration that methods of fish husbandry can be practiced in rural areas without highly sophisticated equipment or complicated techniques. On a recent aquaculture scientific exchange trip to Mainland China AID funded the costs of Dr. Rosenfield of the National Marine Fisheries Service. He is to write a manual of the experiences in aquaculture observed there. Dr. R.O. Smitherman of the Auburn faculty was also a member of the exchange team. Through his effort it is hoped an inter-related system for exchanging information will be established on a continuing basis between Auburn and Mainland China.

In India a long-term program for improving hatchery production, spawning techniques and pond production with polyculture of native Indian and Chinese carp species is now resulting in the production of substantial new sources of high protein food with relatively low economic inputs. Yields of 8,500 kg/ha/yr have been obtained at research stations with modest supplemental feeding. India's fish farming harvest is now 500,000 tons per year and is increasing rapidly. Aquacultural practices in Indonesia are yielding 144,000 tons of fish per year.

Thailand is harvesting 106,000 tons of pond raised fish a year and in Bangladesh the harvest is 76,000 tons a year.

Outstanding examples of aquaculture successes have also been achieved with Auburn University assistance under AID's auspices.

In a Brazilian project farmers cultivating 10 hectares of pond are consistently producing 60 tons of hybrid tilapia annually and farmers are able to recover all construction costs from the first year's profits. Only the lack of adequate numbers of fingerlings is blocking a large-scale expansion of these production methods.

In Panama a rural development activity is being widely expanded. It includes fish culture combined with pig production and vegetable crops. In this system the swine wastes and unutilized feeds are washed into fish ponds, thereby greatly increasing the nutrient content of pond water, which in turn results in an abundant production of phytoplankton. Tilapia feed and grow rapidly on the phytoplankton. Also some of the nutrient rich water is utilized to irrigate home gardens. Thus both fresh vegetables and animal protein are available to such communities at low cost even during the dry season.

In the Philippines total production from aquaculture has increased 32% during the last three years, reaching a present level of 125,000 tons per year. There Auburn played an important role in increasing milkfish production from 350 kg/ha/yr to over one ton/ha/yr. The project affected more than 1000 small-scale farmers who manage an aggregate of 15,000 ha of ponds. In the future this can be extended to 400,000 ha of similar land.

In Jamaica, Auburn is participating in an AID funded fish production project in which a significant quantity of fish has been produced and placed in markets for low income families. During the three years since its implementation 240 tons of fish were produced in government operated ponds and another 60 tons were produced by a group of predominantly small farm operators.

AID and Auburn have cooperated similarly in programs in El Salvador, Colombia, Thailand and Indonesia. Large numbers of aquaculture technicians in these countries have been trained at Auburn and no doubt much of the fish farming there is a result of that training.

On a worldwide basis 36 countries presently have substantial production of fisheries products through aquaculture contributing to a total annual production of 6 million metric tons. Eleven countries each produce more than 100,000 tons of fisheries products annually through aquaculture and it is predicted that world production will double in the next 10 years.

These successes substantiate that aquaculture can contribute toward improved nutrition and employment for the rural poor in LDCs if existing technology is available through improved extension, effective demonstration and continuing education activities. Approximately 18% of present aquaculture production is in the LDCs. These countries could increase their production enormously, by utilizing available labor, land and water resources which are suitable for aquaculture.

The AID funding which has been used to support the development of Auburn's capabilities and to provide a variety of services will expire December 31, 1981. Demand for technical services of this type will continue to increase as additional successful examples of aquaculture emerge and as the technology is effectively transferred to additional LDCs.

The number of graduate students from LDCs enrolled in Auburn's fisheries program has increased from 7 in 1971 to 48 in 1980, and is expected to hold at about 38 for the duration of this agreement. The number of requests for technical assistance has increased steadily since the inception of the Auburn project.

Although it is impossible to accurately estimate the number of future requests for assistance in aquaculture, an increasing number of such requests are being received and further increases are anticipated during future years in response to the successful application of fish farming methodology in LDCs. The following list represents countries which have asked Auburn for assistance or countries for which preliminary discussions have indicated formal requests may be forthcoming within the next year. Auburn may not be able to provide the services needed in every instance, however, the ICA is considered to be the most likely source of assistance to these countries.

<u>Country</u>	<u>Anticipated Service</u>
1. Guatemala	Aquaculture training program
2. Peru	Aquaculture short-course
3. Panama	Technical assistance
4. Egypt	Technical assistance
5. Morocco	Aquaculture program evaluation
6. Thailand	Technical assistance
7. Turkey	Technical assistance
8. Philippines	Aquaculture project development
9. Indonesia	Technical assistance
10. Central African Republic	Technical Assistance

It is almost certain that additional requests will come from countries not included in this list as plans are developed for new activities and as problems are encountered in ongoing aquaculture activities.

A cooperative agreement similar to the present one is also being anticipated in capture fisheries at the University of Rhode Island. The two projects are to be interdependent. A staff member will be appointed to coordinate the two programs, to arrange an exchange program of professors and to arrange for a jointly sponsored seminar interchange. The two universities will thereby strengthen the training offered foreign students and will complement each other's technical assistance program to LDCs.

Two criticisms have been raised about the Auburn activity: The first is that Auburn's linkages with other US institutions have failed to develop to the extent which AID had anticipated. Considerable effort has been expended to overcome this. Auburn is actively cooperating and collaborating with a large number of institutions and organizations in both domestic and international aquaculture and inland fisheries programs.

Auburn University and the University of Washington are in their fourth year of a staff exchange program. An exchange of seminars for students and staff has helped Auburn personnel to acquire more personal knowledge of cool-water fisheries and aquaculture while University of Washington staff acquire experience in warm-water fisheries and aquaculture.

Auburn staff have participated during the past four years in a series of reviews and evaluations of departmental fisheries and aquaculture programs at Louisiana State, Texas A&M and Oregon State Universities. The staff has provided advisory services in fisheries and aquaculture to the University of Florida, University of Kentucky, University of Tennessee, University of Rhode Island, Purdue University and Southern Illinois University.

A watershed management and fish pond development project proposal was jointly submitted by the Universities of Arizona and Auburn. Due to funding constraints it was not implemented. In the past three years, Auburn has provided professional services on long-term assignments to the US Department of Agriculture and the National Marine Fisheries Service under the federal Interagency Personnel Act. By the same token, Auburn has benefited from short-term and long-term professional services acquired from the US Fish and Wildlife Service, various universities and private industrial groups.

Auburn's International Center for Aquaculture and the University of Rhode Island's International Center for Marine Resource Development have jointly provided technical services to various African countries in response to specific requests.

Auburn has developed two continuing regional education programs. The first is a Southeastern Cooperative Fishery Education Project with fisheries agencies of seven states participating: Alabama, Arkansas, Florida, Georgia, Mississippi, Tennessee and West Virginia. It includes: a 1-1/2 day short course carried out annually on a topic that is selected by each of the state fishery agencies; and 2) a 1-1/2 day workshop conducted annually at Auburn for administrators of state fishery agencies on a topic selected by the Steering Committee of this program.

The second is the Southeastern Regional Fish Parasite and Disease Control Project. A clinical and diagnostic disease service is available to each cooperating state. A one-week workshop on fish health is also held on the Auburn campus annually with about 20 fisheries biologists from member states participating.

The selection of Auburn as one of three agencies in a pond dynamics CRSP, along with the University of California at Davis and an Oregon State University Consortium, will allow Auburn to establish close ties with additional institutions. The CRSP planning activity was funded in FY1980. The demand for advisory services in aquaculture may increase at a rate greater than Auburn can handle, and the implementation of an aquaculture CRSP should result in a greater number of personnel qualified in this area. This increasing demand will encourage closer cooperation among all the participating groups in the future.

The second criticism frequently heard regarding Auburn's program is that: "Auburn has not made adequate efforts to develop an interdisciplinary approach to fish farming including the fields of social science, economics, marketing and storage." Auburn has recently involved both sociologists and economists in its program and offers formal graduate level courses in aquacultural economics and technology transfer. Also a major effort is being placed on improving Auburn's capacity in aquaculture economics and fish marketing through its recently implemented AID strengthening grant. While continuing progress is expected toward development of interdisciplinary skills at Auburn, in some cases other institutions will be looked to for expertise in fields such as marketing and the social sciences.

A question also has been raised regarding Auburn's relationships with LDC universities, institutions and government agencies. Its record is good on

this topic. Auburn has worked well with LDC groups and has involved them in AID activities to the extent that is reasonable, is compatible with the LDC institutions' capabilities, and is possible within the funding available.

B. ENVIRONMENTAL IMPACT

Initial Environment Examination. The activities of this project fall into the area described in Environmental Procedure Regulations, Para. 216.2 (c) "Analyses, Studies, Academic or Investigative Research. Workshops and Meetings." These classes of activities will not normally require the filing of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be a set of procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes training and technical assistance directly supportive of USAID and host country activities. Under these guidelines this activity clearly qualifies for a negative determination at the time when a threshold decision is determined.

To the extent that pesticides may be used for the preservation of fish, ICA will comply Rule 16 on Environmental Procedures.

An Initial Environmental examination generally addresses the following areas which should be examined when other aquaculture projects are developed with technical assistance provided under this field service project.

Land Use

Aquaculture has few negative effects on land use. The amount of land developed per region is often small due to the number of suitable sites available. The land used is often of marginal value for agriculture. The effect on a river drainage system is small. There are locally important benefits. The water storage associated with aquaculture can provide water for irrigation, help raise the water table of the immediate area, as well as reduce water runoff rates in highly eroded areas. In Panama aquaculture has helped reduce the exploitation of the land. There the fish pond has become the center of agricultural production. Livestock such as pigs or ducks are grown beside the pond. Their waste is used for fertilizing of the fish pond and the pond water is used for irrigating vegetables. This has produced a high yield of food products in a small area, reducing the need to put much larger areas of land into production using traditional methods that give low yields per area.

The lack of water in an area often causes the land to be increasingly over exploited and pushed past a point where it can recover. The availability of water will enhance a land's capability of recovering from overexploitation by other types of agriculture.

Water Quality

The changes in water quality associated with aquaculture are generally confined to the pond. The pond water may be richer in nutrients than the water of surrounding streams. When the pond is drained the effluent of the pond is rapidly diluted in the receiving stream and has little effect on the environment.

Natural Resources

The amount of habitat modified by aquaculture is generally small relative to the amount of that habitat present in an area. By constructing a pond many new habitats are created and others are improved by the increased availability of water. Aquaculture often involves use of an exotic fish species. The effects of introducing an exotic fish species will depend on the nature of the habitat into which it is released. There are many examples where the proper selection of an exotic fish has made a significant contribution to a fishery. Similarly there are examples where the poor selection of a species has had negative effects.

Air Quality

Aquaculture has very little effect on air quality. There is a slight increase in noise level during construction or pond harvesting. Air pollutants resulting from aquaculture are insignificant.

Socio-economic Effects

There are a variety of socio-economic benefits resulting from aquaculture. The fish produced provide a source of protein and income to the farmers. The introduction of aquaculture often serves as the focus for introducing other concepts in a community. The inputs of materials used in aquaculture are often agricultural by-products that are in low demand for other uses. There may be some competition for resources, but it is often limited and their use in aquaculture justified.

Health

The effects of aquaculture on health are positive. The nutritional benefits from aquaculture are significant because malnutrition is a major factor in most serious health problems in developing countries.

The aquatic environment created by aquaculture can be a source of disease organisms and their vectors, which can be controlled. Often a farmer is in contact with the pond water only five or six times a year; whereas he may be in contact daily with other sources of infection. The introduction of aquaculture into an area rarely has a measurable adverse effect on water-associated diseases. In addition, the clearing of marshy lands for fish ponds will reduce the amount of water-associated diseases and the insects produced. However, it should be noted that the small amount of land involved would have no effect on the overall incidence of malaria in a region.

Cultural Effects

The introduction of aquaculture into a region would be only one aspect of development. This development will have cultural effects as life styles are changed and traditional customs are modified. Physical sites of religious, historical or archeological significance can be recognized and an aquaculture project easily modified to preserve them.

In accordance with the Code of Federal Regulations 22 part 216, regulation 16 regarding Environmental Procedures for USAID there are classes of action for which Initial Environmental Examination, Environmental Assessment and Environmental Impact Statements are not generally required or appropriate. They include:

1. Education, technical assistance or training programs except to the extent such programs include activities directly effecting the environment (such as construction of facilities).
2. Controlled experimentation exclusively for the purpose of research and field evaluations which are confined to small areas and carefully monitored.
3. Analysis, studies, academic or research workshops and meetings.
4. Document and information transfers.
5. Institution building grants to research and educational institutions in the U.S.

These exceptions to preparing an Initial Environmental Examination apply directly to all project activities of the Cooperative Agreement.

If the question is the environmental effects of aquaculture and not the environmental effects of the Cooperative Agreement then only generalizations can be made. The most important factor to consider is the scale of aquaculture. There are a variety of negative environmental effects associated with the development of large reservoirs. They include:

1. The loss of often fertile bottom lands and the displacement of people from those lands. This is not true with aquaculture. The land used for aquaculture is generally of marginal value for traditional agriculture. The availability of suitable sites for aquaculture is dispersed and no one enormous block of land would be flooded as with a reservoir.

2. The loss of nutrients and sediments downstream from a reservoir can be significant because a reservoir is located on a major stream and can store the sediments of a very large watershed. Aquaculture ponds receiving runoff water are located high in the watershed and even a density of 12 ponds per square mile would modify the runoff of only approximately 15% of the land area. Similarly farm ponds have only very local effects on flood control.

3. The creation of a large reservoir can favor the development of various public health problems. The large size of a reservoir makes it impossible to prevent the water from becoming contaminated with disease organisms and vectors. This is particularly true in the case of schistosomiasis and malaria. An aquaculture pond is small enough that the contamination can be effectively controlled.

These are all factors associated with scale. The impact of aquaculture is localized and can be controlled.

C. FINANCIAL ANALYSES

Very probably the International Center for Aquaculture has spawned more host country projects which in turn have hired long-term Auburn personnel than is the case in most AID supported university projects. In the case of long-term projects, however, the missions are able to plan ahead. The problem is how to provide unanticipated technical services quickly when without previous notice, a mission finds it needs them. No system has proven as effective in this regard as having a staff of experts on board available for call. Missions cannot and should not be expected to pay the cost of this overhead. Under the Cooperative Agreement mechanism such as projected for Auburn, however, a staff is maintained which works on projects other than mission activities when at home on the Auburn Campus. They provide short courses. They give special training in fields such as tropical aquaculture and warm water fish diseases. They write special texts and information bulletins applicable to the needs of the LDCs and in some cases they perform adaptive research which makes U.S. know-how applicable to the different conditions in the LDCs.

Over the years the Central Bureau has looked for different systems by which it might make available technical assistance to the field. Many means have been tried to make the missions pay for such short-term services, but until now none have proven as successful as central support. S&T/AGR has maintained such projects as the Mississippi State seed projects, the Kansas State grain storage project, the Oregon State weed projects and the Auburn University aquaculture program to provide immediate response to Missions and LDCs. This has proven to be one of the most appreciated services provided by the Central Bureau.

Looking at the issue more in-depth, it little matters where the money for these short-term field services is provided. Whether S&T or the mission is charged, the cost is borne within the AID budget, and when the staff is hired with core funds for specific tasks, the cost is no doubt less than when such individuals are maintained on a retainer basis. In the case of Auburn University specifically, we are obtaining more services for the AID investment than at most other universities. Salaries at Auburn are among the most reasonable of any state university. The overhead on modified total direct cost is only 28%. We are advised by SER/CM that in most U.S. universities it now averages 70%. SER/CM has further informed us that whereas AID no longer uses the Basic Ordering Agreement, (it having been ruled an inappropriate contract form by the AID counselors) the I.Q.C. is still employed. The overhead on I.Q.C.s is at a minimum 100% and it often reaches considerably above that. At a cost of \$2,250,000 for five years the Auburn University Cooperative Agreement would no doubt provide AID more services at lower cost than almost any other agreement.

In the case of aquaculture training the Auburn facility is by far superior for post-graduate students than any other U.S. university. It provides them many extra accommodations that are not normally part of the U.S. student curriculum. Special language training, courses in small pond production technology, and field trips to other aquaculture centers in different sections of the U.S. are but a few of these accommodations. A special section of the aquaculture field station is maintained for work on tropical species and a large percentage of

the foreign students' time is spent gaining practical field experience there. These extras have caused Auburn's students to be among the most prominent in aquaculture around the world.

It is all too easy to rationalize that, "Missions should pay for short and long-term participant training and those fees should reflect the cost of Auburn in providing such service." The fact is that missions are restricted in what they can pay for a year of participant training and the specified amount may not cover these extra benefits.

The funds AID made available under this agreement will be used for: 1) the development, maintenance and support of the Auburn International Center for Aquaculture and its LDC training programs (Core Support); and 2) the in-country technical assistance and short courses requested by USAIDs, LDCs and the Regional Bureaus (Advisory Services). The disbursement period for the agreement will be January 1, 1982 - Dec. 31, 1986. Work for a five-year period is outlined which will require support of approximately \$2,250,000. Approval of this project for the five-year period is recommended and funding for the first 12 months (\$360,000) is requested in 1982. Thereafter, expenditures are expected to proceed at the rate of \$400,000 in 1983 and \$440,000 in 1984, \$500,000 in 1985, and 550,000 in 1986.

Short-term technical assistance provided to LDCs and USAIDs under this project normally will be limited to 30 person-days on any one assignment. It is recognized, however, that in special circumstances, it may be necessary to exceed the 30-day limitation, and that some requests may require a team effort rather than an individual specialist. Under circumstances in which Auburn's project funding is not able to provide the desired level of technical assistance, this will be available to AID Missions or host countries at their expense whenever it can be arranged within the schedule of other project commitments.

There follows two illustrative budgets. The first represents how the ICA anticipates it will utilize the AID contribution (inputs) for the five years of the Cooperative Agreement and the second budget represents what ICA considers to be the outputs to be derived from that contribution.

D. SOCIAL ANALYSIS

No aspect of this project has undesirable social consequences. In most LDCs, as in the developed world, fish is accepted as a desirable food. Where malnutrition is manifest it is a superior source of low-cost animal protein. In many parts of the world fishponds are part of the rural environment, and where they are not, the introduction of pond culture has been readily accepted. It is generally considered an attractive activity from the community viewpoint. The educational, extension, research and organizational aspects of this project therefore pose no social problems.

INPUT BUDGET
(For 5 yr. Extension)
PROJECT TITLE: Aquaculture Technology Development
PROJECT NUMBER: 931-1314

<u>Input Item</u>	<u>First Year</u> FM:1-1-82 TO:12-31-82	<u>Second Year</u> FM:1-1-83 TO:12-31-83	<u>Third Year</u> FM:1-1-84 TO:12-31-84	<u>Fourth Year</u> FM:1-1-85 TO:12-31-85	<u>Fifth Year</u> FM:1-1-86 TO:12-31-86	<u>FIVE YEAR</u> <u>GRAND TOTAL</u> FM:1-1-82 TO:12-31-86
A. Core Support						
On Campus Services	\$148,000	\$164,000	\$180,000	\$205,000	\$226,000	\$923,000
Professional	(105,000)	(117,000)	(129,000)	(149,000)	(164,000)	(664,000)
Support Personnel	(12,000)	(13,000)	(14,000)	(15,000)	(17,000)	(71,000)
Graduate Assistantships	(31,000)	(34,000)	(37,000)	(41,000)	(45,000)	(188,000)
Admin. Costs-Supplies/Equip.	7,000	8,000	9,000	10,000	11,000	45,000
Travel	9,000	11,000	12,000	14,000	15,000	61,000
Library Aquisitions	2,000	2,000	2,000	3,000	3,000	12,000
Publications/Printing	9,000	10,000	11,000	12,000	13,000	55,000
<u>Subtotal-Core Support</u>	<u>\$175,000</u>	<u>\$195,000</u>	<u>\$214,000</u>	<u>\$244,000</u>	<u>\$268,000</u>	<u>\$1,096,000</u>
B. Advisory Services						
Professional Staff						
(Release time)	44,000	49,000	54,000	65,000	71,000	283,000
Travel	22,000	25,000	27,000	31,000	34,000	139,000
Admin. Costs/Med. exams etc.	4,000	4,000	5,000	6,000	7,000	26,000
<u>Subtotal-Advisory Services</u>	<u>\$70,000</u>	<u>\$78,000</u>	<u>\$86,000</u>	<u>\$102,000</u>	<u>\$112,000</u>	<u>\$448,000</u>
C. Overhead--(Subtotal)	\$72,000	\$80,000	\$88,000	\$95,000	\$105,000	\$440,000
D. Fringe Benefits*--(Subtotal)	\$43,000	\$47,000	\$52,000	\$59,000	\$65,000	\$266,000
<u>Total-Inputs to Auburn</u>	<u>\$360,000</u>	<u>\$400,000</u>	<u>\$440,000</u>	<u>\$500,000</u>	<u>\$550,000</u>	<u>\$2,250,000</u>
E. Indepth Evaluations (For DS/AGR use)	-	\$25,000	-	\$25,000	-	\$50,000
<u>GRAND TOTAL</u>	<u>\$360,000</u>	<u>\$425,000</u>	<u>\$440,000</u>	<u>\$525,000</u>	<u>\$550,000</u>	<u>\$2,300,000</u>

*NOTE: Fringe Benefits equal to 25% of salaries excluding graduate assistantships.

OUTPUT BUDGET
(For 5 yr. Extension)
PROJECT TITLE: Aquaculture Technology Development
PROJECT NUMBER: 931-1314

<u>Output Item</u>	<u>First Year</u> FM:1-1-82 TO:12-31-82	<u>Second Year</u> FM:1-1-83 TO:12-31-83	<u>Third Year</u> FM:1-1-84 TO:12-31-84	<u>Fourth Year</u> FM:1-1-85 TO:12-31-85	<u>Fifth Year</u> FM:1-1-86 TO:12-31-86	<u>FIVE YEAR GRAND TOTAL</u> FM:1-1-82 TO:12-31-86
A. Core Support						
Basic Educational Program	\$98,000	\$111,000	\$122,000	\$138,000	\$152,000	\$621,000
Special Training & Graduate Student Assistantships	31,000	35,000	39,000	44,000	48,000	197,000
Short-Courses (Four Months/Year)	26,000	27,000	30,000	34,000	38,000	155,000
Publications and Manuals	20,000	22,000	23,000	28,000	30,000	123,000
<u>Subtotal-Core Support</u>	<u>\$175,000</u>	<u>\$195,000</u>	<u>\$214,000</u>	<u>\$244,000</u>	<u>\$268,000</u>	<u>\$1,096,000</u>
B. Advisory Services						
Short-Courses & Seminars in LDCs	28,000	31,000	34,000	42,000	46,000	181,000
Evaluations of Aquaculture Development Programs	10,000	11,000	12,000	15,000	16,000	64,000
Short-term Advisory Services in LDCs	32,000	36,000	40,000	45,000	50,000	203,000
<u>Subtotal-Advisory Services</u>	<u>\$70,000</u>	<u>\$78,000</u>	<u>\$86,000</u>	<u>\$102,000</u>	<u>\$112,000</u>	<u>\$448,000</u>
C. Overhead	\$72,000	\$80,000	\$88,000	\$95,000	\$105,000	\$440,000
D. Fringe Benefits	43,000	\$47,000	\$52,000	\$59,000	\$65,000	\$266,000
<u>Total-Outputs From Auburn</u>	<u>\$360,000</u>	<u>\$400,000</u>	<u>\$440,000</u>	<u>\$500,000</u>	<u>\$550,000</u>	<u>\$2,250,000</u>
E. Indepth Evaluation Reports (For DS/AGR)	-	\$25,000	-	\$25,000	-	\$50,000
GRAND TOTAL	<u>\$360,000</u>	<u>\$425,000</u>	<u>\$440,000</u>	<u>\$525,000</u>	<u>\$550,000</u>	<u>\$2,300,000</u>

Field-level observations in different contexts over several years indicate that fish farming promotes the well-being of the individuals, families and communities who practice it. No manifest or latent negative effects upon the social structure of the groups involved with, or influenced by, aquaculture development have been identified. Although more systematic efforts to measure the social impact of specific fishculture projects are to be accomplished, available evidence shows that communities with very different histories, political institutions, cultural values, kinship systems and traditions concerning land tenure and agriculture production can achieve noteworthy achievements in their quality of life through successful fish farming.¹

Generally, there are very few cultural prohibitions in LDCs against the consumption of fish. The groups which hold such beliefs are tiny in proportion to those who could potentially benefit from fishculture. Protein is badly needed and the need is recognized. Competition from capture fisheries is negligible. As indicated in the Economic Analysis section, there is typically little competition for the land suitable for ponds with the occasional exception of rice cultivation. There often exists considerable interest in fish farming among rural agriculturalists in a wide range of places worldwide. In many projects the problem is in deciding who among the many interested should be given priority. In areas in which the interest is not as intense, it has been effectively generated through demonstrations. Given this advantage, project resources can be more efficiently used in improving the target groups' technical management and marketing skills and less effort is needed to initially promote basic ideas.

No development effort can be entirely immune to the larger political and economic structure in which it is located, but fish culture does offer advantages in comparison with programs that are typically more dependent on macro-level social institutions and a complex infrastructure. The basic resources needed in small-scale aquaculture can be relatively easily managed at the discretion of individual farmers. Consumers are usually very close at hand.

¹ Pretto-Malca, R. Aprovechamiento de las aguas y excretas de la explotación porcina para el cultivo de peces en Panama. Rev. Lat. Acui. 3, 1, (March 1980) pp. 29-33.

Grover, J.H., D.S. Street, P.D. Starr. Review of Aquaculture Development Activities in Central and West Africa. International Center for Aquaculture, Auburn University, Research and Development Series No. 28 (November 1980) 31 pp.

Although a more sophisticated technical base, transportation and marketing system increases productivity, impressive yields are possible with modest resources. A more "forgiving" system than most other agricultural endeavors, fishculture can also be successfully practiced in spite of the many social demands, rituals and obligations which characterize rural life in most societies and may interrupt production schedules for several days. Given this flexibility, fishculture can be an effective way of demonstrating the rewards of systematic planning, implementation and management to be found in agriculture generally. Working with such principles in mind has led to impressive accomplishments in Panama where over the last few years several hundred independent fish-swine-vegetable farms have been established and are flourishing. These farms, in which animal-plant wastes are used as fish feed, have become focal points for regional development. They have also promoted the diffusion of new agricultural methods over a considerable area while producing needed foods.²

It is true that the increased production of fish in some communities alters existing social relationships and patterns of dependence. Aside from minor problems regarding poaching and the theft of fish that can be controlled, however, it has not been demonstrated that such increases introduce negative or undesirable disruptions in local communities or otherwise entail social liabilities. To the contrary, it generally provides resources that were previously lacking and needed.

Recognizing that social benefits can accrue only if increased income is put to certain uses it remains important to consider how successful fish farmers use their profits. While a variable portion of the fish produced tends to be consumed by the farmer and his kin, enhancing the quality of their diet, the cash gained from the remainder is generally used for school fees, medical care and family necessities. Some also tends to be used to upgrade the farmer's production capacity and is used to buy tools, seed or needed additional seasonal labor. In some cases such reinvestment provides additional economic opportunities for rural youth and offers them some alternative to migration to urban areas, which they often perceive to be one of the few ways to escape rural poverty.

A more conservative study was done by Lovshin, 1977 to 1979, in the Morada Nova Irrigation project in Brazil. The results, based on 0.23 hectare ponds, indicated that the net returns in producing per hectare of hybrid tilapia were \$951.70 U.S. There could be substantial gain in economies of scale by growing fish on a much larger scale. This was shown when hybrid tilapia was grown in the Pentecoste irrigation project in Brazil. A net return of \$2,567.85 U.S. was obtained from a 0.5-ha production area (See Table 1 on page 27). The impact of growing fish on the economy of a developing country can be significant. In a country like Brazil with an estimated 8,294,400 hectares of land suited for aquacultural production, if 1.0 percent of this land were intensively stocked with hybrid tilapia, the net returns to the farmers involved - taking the most conservative estimate - would be approximately \$78,937,804.08 U.S. At market prices, this figure would represent 0.1 percent of the 1976 GNP. However, if one considers the total volume of business undertaken in

2 Pretto-Malca. op. cit.

this country when one quarter of its aquacultural lands are utilized, the outcome would be phenomenal. If the total revenue obtained from a project to produce fish on 25.0 percent of potential lands is considered, the volume of business would increase to \$383,450,112.00 U.S. which would represent 0.3 percent of the 1976 gross national product.

In McCoy's study, he estimated that 1,102,248 man hours would be required to service the processing needs of 35 fishermen producing 25 to 30 metric tons of fish. El Salvador is estimated to have 583,200 coastal hectares of land suited for aquacultural production. If only 1.0 percent of these lands were brought into production the number of man-hours required to process the total fish produced would have a significant impact on rural employment. If each hectare of pond produced 3.0 metric tons of fish per year, the number of man-hours which would be required to process fish produced on 1.0 percent of land in El Salvador would be 71,425,670.

Similar calculations can be made for each developing country with land suitable for aquaculture and greater or equivalent impacts on employment would be obtained. If research aims are directed in developing countries at increasing fish production to 1.0 percent of land suitable (which is a very small percent of total land) for aquacultural production, significant gains in employment and quality of life would be obtained.

E. ECONOMIC ANALYSIS

Many inland fisheries operations are carried out on lands uniquely suitable for aquaculture production. The pond culture of fish can be implemented on salted lands, marsh lands, coastal flats, mangrove swamps and other marginal agricultural lands. Through aquacultural production there can be an increase in animal protein and farm income of rural families in LDCs without any major changes in land use patterns.

Inland fisheries activities can be recommended to the LDCs, not only because of their direct economic advantages to the economy of the LDCs, but also because of the indirect advantages and their importance in other directions. The importance of aquaculture as a distinct sector of the economy may be considered on these grounds:

1. Aquaculture is an efficient user of land.
2. High protein foods are produced that contribute to improved nutrition and income;

⁴ McCoy, E.W., Economic Analysis of the Inland Fisheries Project in El Salvador, International Center for Aquaculture, Agricultural Experiment Station, Auburn University, Research and Development Series No. 6, Project AID/la-688, Feb. 1974.

3. Opportunities are offered for employment, and
4. Markets are provided for agricultural by-products, producer equipment and supplies.

Aquaculture can make good use of land not suited for other crops. Such lands include brackish, salty or marshland and marginal agricultural land. Fish culture in brackish water has been carried out in Java for over 600 years. In 1974, it was estimated that there were approximately 180,000 hectares of brackish water ponds in Indonesia. Production of fish in these areas had reached a plateau, and to increase production there had to be an increase in technology. The transfer of improved technology could result in doubling the production of fish from these waters. In a two-year contract between the ICA and the Government of Indonesia it was stated as one of the major objectives that production would increase from the present level of 500 kg to 1,000 kg per hectare per year.

Fish has also been grown in rotation with other crops such as rice on swamp lands. Species of fish such as the carp Cyprinus carpio, Tilapia mossambica and Puntius javanicus have been grown in rice fields. This culture of fish and rice has been practiced in Indonesia, Philippines, India and many other developing countries.

Fish can be more efficiently produced than other farm animals. Since fish, unlike land animals, do not need to support themselves against gravity or maintain body temperature, the dietary energy requirement for metabolism in fish is less than for land animals. For this reason fish are better feed converters than land-based animals. Feed conversion rates for fish are about one and one half times as efficient as for swine or chickens and about twice as efficient as for cattle or sheep. Fish can also be crowded more closely than land-based animals. Thus, in well managed environments, 2000 to 3000 kg or more fish can be produced per hectare per year while the maximum figure for cattle is 500 to 700 kg per hectare (Delaney and Schmittou).¹ While cattle must be fed a high protein feed grain (which is energy dependent) for rapid growth, fish can thrive well on nutrients found in their own environment. This makes fish culture an industry well suited for developing countries such as Egypt, Africa, Indonesia and other Latin American and Asian countries whose resource base is limited.

Besides supplementing the dietary requirements of rural farm families, fish culture can produce substantial earnings for the farm family. The returns from fish can be higher than from many other farm enterprises because the average cost of producing a unit of fish is lower and the average market price higher.

¹ Delaney, Richard J. and Homer R. Schmittou. Aquaculture Production Project, Philippines AID Project Paper.

² Bell, F.W. and E.R. Canterbury. Aquaculture for the Developing Countries; A Feasibility Study. (Cambridge, Massachusetts, Bellinger Publishing Company, 1976) 266 pp.

TABLE I

Cost and Returns from Growing .23 Hectare of Tilapia Hybrid on
Morado Nova Irrigation Project in Brazil

Item	Unit	Price/Unit	Quantity	Value or Cost
Grose Receipts	kg	.67	1,587	\$1,063.29
Variable Cost				
Rice Bran	kg	.05	5,388	299.40
Cattle Manure	kg	.009	8,000	72.00
Labor for Harvest				<u>12.81</u>
Total Variable Cost				\$ 354.21
Fixed Cost				
Guard Service				10.25
Amortization of Ponds (10 years)				442.44
Equipment				<u>37.50</u>
Total Fixed Cost				\$ 490.19
Total Cost				<u>\$ 844.40</u>
Net Returns				\$ 218.89

There was no interest charge on operating capital. If 11.0 percent is charged the net returns would be lowered by \$38.96.

On a per acre basis, the net returns would be \$951.70. If 1.0 percent of 8,294,400.00 were used the total returns would be:

$$82,944.00 \times 981.70 = 78,937,804.08$$

The Cost Return Values for 1 hectare pond based on 8.5 hectare pond on the Pentecoste Irrigation Project would be:

Gross Receipt	\$7,079.63
Variable Cost	<u>2,295.28</u>
Returns Above Variable Cost	\$4,802.35
Fixed Cost	<u>2,234.50</u>
Net Returns	\$2,567.85

The GNP of Brazil in 1976 at market prices was 125,570 million dollars. Therefore, an increase in fish production up to 1.0 percent of its aquacultural potential would result in net income which would be 1.6 percent of the GNP. The total volume of business would be 0.3 percent.

Bell and Canterbury estimated that the percent of revenue not identified (after operating cost was subtracted) in producing 37.0 kg of tilapia was 20.0 percent. The percent of revenue not identified in producing 4866.0 kg of Indian carp was 63.4 and 64.3 percent for 77,922.0 kg of milkfish.²

This means that the operating ratio for tilapia is 80 percent - an improvement is obtained when Lovshin's study is examined.³ The operating ratios for Indian carp and milkfish are 36.6 and 35.7 percent, respectively. When this is compared to production of 680 head of swine in the U.S. where production is highly efficient, the operating ratio is 65.0 percent. The operating ratio for raising 20 steers in the U.S. is even worse - 89.0 percent. The operating ratios indicate the portion of revenue from the unit of enterprise that is absorbed by operating expenses. The capital requirements for beef cattle and swine are very high; therefore, the high operating ratio tells the investor the amount of revenue left to pay for fixed costs and for management effort.

McCoy in 1974 made an economic analysis of the inland fisheries project in El Salvador and showed that the returns above operating costs in producing a hectare of tilapia and guapote tigre were \$4,899.98 U.S. The return to capital investment were 22.0 percent. The going interest rate on borrowed capital was 9.0 percent. This margin of 13.0 percent indicates that aquacultural production is a very lucrative enterprise.⁴

F. WOMEN IN DEVELOPMENT

Assistance in aquaculture benefits women to a very large degree. Fish ponds as chicken coops tend to be close to the family dwelling in most LDCs. As in the case of poultry, the production and care for fish is very much the woman's responsibility.

Also, as regards the post harvest processing of fish, women play the dominant role. This is true both of domestically produced fish and those which are artisanally harvested.

Finally the marketing of fish in most LDCs tends to be almost exclusively the profession of women.

³ Lovshin, L.L. Progress Report on Fisheries Development in Northeast Brazil, International Center for Aquaculture, Agricultural Experiment Station, Auburn University, Research and Development Series No. 26, Project AID 1152T 0.2 Feb. 1980.

PART IV IMPLEMENTATION ARRANGEMENTS

A. ANALYSIS OF ADMINISTRATIVE ARRANGEMENTS

The International Center for Aquaculture at Auburn University has been receiving AID funding for the advancement of pond fish culture since 1968. The personnel and procedures required for administering the Cooperative Agreement are established and have functioned satisfactorily for over eleven years. The competence of the Center's administrators has been established in this regard.

During the last eleven years AID has assisted in the development of a specialized capability in the field of tropical freshwater aquaculture at Auburn University through seven years of 211(d) grant assistance and more recently by means of a three-year special support grant. The capability that now exists at Auburn is unique among US institutions. No other US institution has an aquaculture program of comparable size and magnitude, or an aquaculture curriculum as diverse and complete. More importantly, Auburn's program is unique in that it is oriented toward fish production in developing countries as opposed to production of higher priced species in the US. During the period of grant support, Auburn personnel gained an impressive base of experience working on a large number of short- and long-term projects in LDCs. Many LDC students have been educated at Auburn and Auburn experience includes a wide variety of research, training and extension applications overseas. For that reason, no other US institution has comparative competence which qualifies it to undertake the project described herein.

B. IMPLEMENTATION PLAN

This PP has been developed jointly by S&T/AGR/RNR and Auburn University based on their assessment of what Auburn can contribute and on the needs for project activities as seen by S&T/AGR/RNR. Effort has been made to be responsive to needs expressed by Regional Bureau representatives contacted during preparation of the paper. The on-campus support portion of the budget is to be used by the implementing agency at their discretion within the categories specified, except that responsibilities itemized in the attached scope of work are considered essential to the project. A Cooperative Agreement seems to be an appropriate mechanism for this project, as under that mode both the on-campus core funded activities and the LDC advisory services component will jointly be funded. It will elevate the status of the ICA to an autonomous center from an agent of AID in which capacity it has served until now. S&T/AGR/RNR will, however, continue to exercise control over the use of funds designated for overseas technical services. For example, S&T/AGR/RNR approval of each service activity will be required prior to Auburn responding to technical assistance requests from the LDCs.

C. EVALUATION PLAN

The project will be managed by an AID fisheries specialist within the Renewable Natural Resources Division of S&T/AGR. The Fisheries Subcommittee of the Technical Program Committee for Agriculture (TPCA) will serve in an advisory-evaluation role for AID.

The project implementing agency (Auburn) will appoint a Project Director who will be directly responsible for project operations and project supervision on a day-to-day basis. He will serve as the implementing agency's immediate contact with the AID Project Manager. The Project Manager and the Project Director will maintain communications as appropriate and necessary for effective project management. Ad hoc meetings between the AID Project Manager and the implementing agency Project Director will be facilitated as necessary, taking advantage of possible visits to Washington by the Project Director in connection with project and non-project related activities.

Four evaluations are contemplated during the five years of project activity. In July 1983 an indepth team review will be undertaken to determine whether the project implementation is proceeding on course as specified by Auburn. As part of the evaluation a recommendation will be prepared regarding a plan of subsequent funding increments by which AID might effectively finance the activity. The possibility of Regional Bureau participation in project funding will be investigated. At the end of the 1st and 3rd years of project activity, routine evaluations will be performed with the Project Manager presenting a program report to the fisheries subcommittee of the TPCA. The fourth project evaluation will take place no later than 12 months prior to the termination of the fifth year of project activity and as a primary objective it will decide whether the Cooperative Agreement should be further extended. This evaluation will be an in-depth team review.

D. PROJECT REPORTING

1. An annual report of project activities will be required within thirty (30) days of the anniversary date. A fiscal report showing actual expenditures during each year will be included in the annual report. Twenty-five (25) copies of the annual report will be submitted to the AID project manager.

2. Twenty-five (25) copies of formal reports, manuals and publications will be supplied to S&T/AGR, while two (2) copies of all trip reports will be supplied to the AID Project Manager.

3. Ten (10) copies of each quarterly information letter will also be sent to the AID Project Manager.

4. In its assistance to LDCs special note should be taken of any outstanding achievements which are directly a consequence of the ICA program. These achievements should be reported to the AID Project Manager in the form of success or impact stories.

E. RELATED ACTIVITIES OF OTHER DONORS

The FAO, UNDP, World Bank and several donor nations are supporting aquaculture research and development activities oriented toward encouraging the efficient production of high quality protein in LDCs.

The AID Project Manager in association with the implementing agency Project Director will have the responsibility for ascertaining that the Auburn project activities do not compete with or duplicate work being supported by other donors.

Cooperation and information exchange among donors is generally good and complementary activities are planned whenever possible. Because the needs are large and the assistance relatively small, cooperation among groups has been effective.

F. SCOPE OF WORK

General

With more than eleven years of AID grant and contract support behind it, the International Center for Aquaculture at Auburn University has no doubt become the strongest bastion for aquaculture training and development in the US. Whereas until now it has served as an agent of AID in training LDC students in the disciplines necessary to make fish culture a prominent rural industry in many parts of the developing world and while until now it has acted as an AID contractor in extending abroad the technical assistance required to make USAID and host country aquaculture projects succeed, the Center would like now to accept the responsibility of such international development activities as an entity on its own. Recognizing this desire the Agency for International Development intends under the present five-year Cooperative Agreement to support, strengthen and sustain the International Center for Aquaculture as a Center of expertise on a continuing basis. It recognizes the need of continued support to the budget of such a Center if it is to survive. Although the Agency for International Development can make no commitment for continuing its support to ICA after the present five-year Cooperative Agreement terminates on Dec. 31, 1986 there is built into this Agreement a project review process which is designed to keep AID advised as to how its contribution to ICA has been made use of and based on the success of that program, and the availability of funds at the time, AID will consider extending its support to the Center beyond the anticipated termination date.

Although ICA has made certain basic commitments to AID in regard to the extent of the education program it will provide and the breadth of the technical assistance program it will make available to LDCs, under this Cooperative Agreement it is intended to give to ICA an extensive degree of latitude in the development of the ICA program of aquaculture development. It is understood that the ICA program shall be for the purpose of assisting aquaculture development under the tropical conditions in which most Less Developed Countries are located. However, what activities will be facilitated at the Center and the degree to which the AID contribution will be used for each such activity is to be the decision of the Center and of Auburn University as its parent agency. AID will, however, continue to react with the Director of the ICA on an intimate association basis through a Project Manager designated in S&T/AGR/RNR. All travel to LDCs either for the purpose of presenting short courses in host countries to local personnel or for the provision of technical assistance even when requested by USAID Missions will continue to be cleared by the AID Project Manager and no foreign travel shall be approved without his consent and that of the Contract Office.

Two types of activities are to be permitted under the project agreement. These are:

a. Activities in support of the ICA program on the Auburn Campus, i.e., the development of the institution's capacity in the US, (Core Support).

b. Outreach activities related to Auburn programs in the LDCs (Advisory Services).

1. Institutional Capacity Development - Core Support

As regards the work on the Auburn Campus, this shall be for the purpose of developing the ICA capacity to serve the LDCs. Implemented under this category shall be activities which build on the state and federally funded facilities of the Auburn University Department of Fisheries, but which neither the State of Alabama, nor the Federal Government should be expected to fund as they are intended for the advancement of aquaculture in the United States. Four areas of concentration will be stressed as specified below:

a. Training. Under this Cooperative Agreement ICA will provide facilities for the instruction of LDC students. A high degree of faculty involvement will be utilized in graduate degree and special training. Extra tutorial services will be provided to assist the foreign student to keep up in his work. Courses in tropical aquaculture which are not a normal part of the fisheries curriculum will be offered for the LDC students special benefit. The ICA will maintain adequate facilities in its laboratories and special research ponds at its field station for the use of the LDC student body.

ICA will maintain openings for up to thirty-five (35) LDC graduate students to study at any one time in the Department of Fisheries on the Auburn Campus.

It will provide a four-month short course each year in practical aspects of fish production for up to twenty-five (25) special students who either occupy or will occupy responsible positions as officers in the fisheries programs of their respective countries.

It will arrange special training between quarters and during vacations and provide travel opportunities for LDC students to observe and study elements of aquaculture in other regions which will complement their training at Auburn.

b. Retention of Special Staff to Provide Technical Assistance. The grant will allow ICA to allocate forty (40) months of senior professional staff time to matters related to LDC fisheries development both on campus and in the field. Particular attention will be extended to preparing these staff for their assignments. Special studies such as language training, area studies and participation in related conferences and workshops may be financed from AID funds.

c. Information Services. In addition to improving the ICA library facilities for students on the Auburn Campus, the Cooperative Agreement will facilitate the following components.

(1) The ICA Information Service will be expanded to offer a broader data base from which to provide responses to specific questions from USAID Missions and LDCs.

(2) Information and training materials including instructional information and reference material will be developed and made available to AID Missions, cooperating countries and students. To the extent possible this information will be produced in English and Spanish and may be translated to Portuguese and French.

(3) At least two (2) special farmer-type bulletins and training manuals will be prepared in pertinent fields of fish culture each year.

(4) A quarterly newsletter containing information on recent developments in fish culture and appropriate new technologies for LDC fish production will be printed and distributed four times a year. At least five hundred (500) copies will be distributed, no less than one-half in LDCs.

(5) Reports, surveys and evaluations which are directly attributable to project activities will be published and distributed.

d. Research. ICA will concentrate its research efforts on investigations appropriate to small-scale farm fish production, particularly as related to the tropical conditions of the LDCs. Up to thirty-six (36) person-months of graduate and research assistantships will be provided annually to promising LDC students to study and undertake investigations in aquaculture developmental activities. Appropriate topics may include:

(1) Genetic manipulation of tilapia species for more rapid growth, more efficient food conversion and improved physical characteristics.

(2) Interspecific hybridization for the development of unisexual progeny.

(3) Polyculture to reduce overpopulation and thereby increase total fish harvest.

(4) Fish/small animal associations for dual purpose animal production and economization of energy utilization.

(5) Development of low-cost fish feeds.

(6) Post harvest fish processing.

2. Outreach Activities in LDCs - Advisory Services

Under the Cooperative Agreement the International Center for Aquaculture intends to provide USAID Missions and LDCs a basic component of assistance each year in in-country training and technical assistance upon Mission request. Additional in-country training and/or technical assistance will also be available at the cost of the requesting USAID Mission or LDC providing the ICA has staff available and can release the desired expertise at the time required. Three areas of assistance are anticipated:

a. Training programs. As part of its overseas education program ICA will provide at least one (1) short course in an LDC in 1981 and one (1) in 1982. It will be equipped to provide short courses, special seminars and workshops at mission request when mission funded.

b. In-country Technical Assistance - The ICA will undertake short-term assistance under this program at the request of and with funding of travel by USAID Missions when mission funding is available. Special teams will be assigned to focus on specific aquaculture problems for short periods of time not to exceed thirty (30) calendar days per mission per year. Up to eight (8) months of ICA specialists' time will be made available for these services in 1981 and up to sixteen (16) person-months in 1982 and each year of the Cooperative Agreement thereafter. Additional technical assistance beyond the 30-day limit will be provided by the ICA as staff are available, when missions so request and pay for the additional service. Assistance may include but is not restricted to:

(1) Feasibility and pre-feasibility studies leading to the development of possible aquaculture projects.

(2) Specific recommendations on pond culture, brood stock production, pond management, agrobusiness projects designed to assist small-scale fish producers, environmental assessments, feeds and feeding and evaluation of technical studies and proposals.

(3) Impact evaluations on the design, implementation and follow through of Mission funded and host country aquaculture activities.

c. Long Term Activities at Mission Expense. When possible ICA will make use of the facilities maintained and/or developed under the Cooperative Agreement to obtain long term assistance for Mission funded aquaculture projects or loan funded activities supported by AID and other donor agencies when such assistance is requested and funded by special contractual agreements with the Center.

ANNEX A
SOURCES OF FUNDING OF ICA 1977-78 THRU 1980-81

Department of Fisheries and Allied Aquacultures
International Center for Aquaculture
Auburn University
October 1980

Sources of Funding	1977-78	1978-79	1979-80	1980-81
Federal (AID Related)*	466,671	1,155,877	991,888	545,526
Federal (Non-AID Related)	358,561	413,977	515,734	778,581
Auburn University	602,113	641,742	642,957	462,100**
Alabama & other states	126,560	121,190	174,454	167,365
Industry	144,334	112,745	81,976	186,715
International (non AID)	---	15,750	26,292	136,636
TOTALS	\$1,698,239	\$2,461,281	\$2,433,301	\$2,276,923

*Does not include the Title XII Aquaculture CRSP or AID/AU Cooperative Agreement presently under development

**Does not include sales or overhead

LIST OF SHORT TERM ICA FOREIGN ASSISTANCE

Chronological List of Short-term Foreign Work
Carried Out by Staff of
the International Center for Aquaculture
Department of Fisheries and Allied Aquacultures
Auburn University, Alabama 36849

January 1979 - December 1980

DATE	COUNTRY	STAFF	PROJECT	PER. DAY
01/06/79-03/31/79	Italy (FAO)	D. F. Leary	Asian Development Bank/FAO	
02/01/79-02/12/79	Indonesia	D. D. Moss	AID/ASIA-C-1177	
02/04/79-02/09/79	Panama	G. L. Jensen	AID/DSAN-G-0039	
02/13/79-02/15/79	Thailand	D. D. Moss	AID/DSAN-G-0039	
02/16/79-02/21/79	Kuwait	D. D. Moss	Kuwait Inst Sci Research	
02/22/79-03/03/79	Colombia	G. L. Jensen	AID/LA-C-1176	
03/19/79-03/23/79	Argentina	K. N. Randolph	AID/Mission Jamaica	
03/30/79-04/05/79	Panama	D. D. Moss	AID/DSAN-G-0039	
04/06/79-04/10/79	Honduras	D. D. Moss	Honduras Government	
04/08/79-05/05/79	Panama	E. W. McCoy	World Bank	
04/15/79-04/28/79	Colombia	S. P. Malvestuto	AID/LA-C-1176	
04/15/79-05/11/79	Jamaica	J. H. Grover	AID/LA-C-1166	
04/24/79-05/05/79	Colombia	L. L. Lovshin	AID/LA-C-1176	
04/24/79-05/06/79	Colombia	G. L. Jensen	AID/LA-C-1176	
04/29/79-05/09/79	Colombia	D. D. Moss	AID/LA-C-1176	
05/06/79-05/11/79	Jamaica	L. L. Lovshin	AID/DSAN-G-0039	
05/08/79-06/12/79	Philippines	H. R. Schmittou	AID/DSAN-C-0053	
05/09/79-06/15/79	Panama	R. P. Phelps	AID/LA-C-1176	
05/09/79-06/15/79	Panama	T. J. Popma	AID/LA-C-1176	
05/12/79-06/26/79	Thailand	H. R. Schmittou	AID/DSAN-C-0053	
05/26/79-06/27/79	Italy (FAO)	H. R. Schmittou	AID/DSAN-C-0053	
06/27/79-07/08/79	Colombia	L. Tucker	AID/LA-C-1176	
06/30/79-07/08/79	Colombia	L. L. Lovshin	AID/LA-C-1176	
07/03/79-07/11/79	Panama	L. L. Lovshin	AID/DSAN-G-0039	

Annex B cont'd
LIST OF SHORT TERM ICA FOREIGN ASSISTANCE

DATE	COUNTRY	STAFF	PROJECT	PERS DAY
07/08/79-07/13/79	Panama	L. Tucker	AID/DSAN-G-0039	0
07/08/79-08/06/79	Panama	E. W. McCoy	World Bank	1
07/11/79-07/14/79	Honduras	L. L. Lovshin	AID/DSAN-G-0039	0
07/25/79-07/26/79	Italy (FAO)	J. H. Grover	AID/DSAN-C-0053	0
07/25/79-07/26/79	Italy (FAO)	D. R. Street	AID/DSAN-C-0053	0
07/25/79-07/26/79	Italy (FAO)	P. D. Starr	AID/DSAN-C-0053	0
07/25/79-08/08/79	Panama	C. R. Engle	AID/DSAN-C-0053	1
07/27/79-08/02/79	Zaire	J. H. Grover	AID/DSAN-C-0053	0
07/27/79-08/02/79	Zaire	D. R. Street	AID/DSAN-C-0053	0
07/27/79-08/02/79	Zaire	P. D. Starr	AID/DSAN-C-0053	0
08/03/79-08/11/79	Cameroon	J. H. Grover	AID/DSAN-C-0053	0
08/03/79-08/11/79	Cameroon	D. R. Street	AID/DSAN-C-0053	0
08/03/79-08/11/79	Cameroon	P. D. Starr	AID/DSAN-C-0053	0
08/12/79-08/18/79	Nigeria	J. H. Grover	AID/DSAN-C-0053	0
08/12/79-08/18/79	Nigeria	D. R. Street	AID/DSAN-C-0053	0
08/12/79-08/18/79	Nigeria	P. D. Starr	AID/DSAN-C-0053	0
08/19/79-08/23/79	Liberia	J. H. Grover	AID/DSAN-C-0053	0
08/19/79-08/23/79	Liberia	D. R. Street	AID/DSAN-C-0053	0
08/19/79-08/23/79	Liberia	P. D. Starr	AID/DSAN-C-0053	0
08/25/79-09/06/79	Kuwait	D. D. Moss	Kuwait Inst Sci Research	11
09/31/79-09/08/79	Colombia	J. W. Jensen	AID/LA-C-1176	09
09/31/79-09/01/79	Panama	C. R. Engle	AID/DSAN-G-0039	01
09/02/79-09/09/79	Colombia	C. R. Engle	AID/LA-C-1176	08
09/14/79-10/27/79	Colombia	E. W. McCoy	AID/LA-C-1176	14
10/18/79-10/30/79	Saudi Arabia	D. D. Moss	ARAMCO Services, Inc.	12

-38-
Annex B cont'd
LIST OF SHORT TERM ICA FOREIGN ASSISTANCE

DATE	COUNTRY	STAFF	PROJECT	PE D
02/03/80-02/22/80	Thailand	A. R. Cavender	AID/DSAN-C-0053	
02/08/80-02/15/80	Sudan	R. T. Lovell	IDRC (Canada)	
02/18/80-03/01/80	Guyana	K. N. Randolph	USAID/Guyana	
02/27/80-04/01/80	Brazil	L. L. Lovshin	Government of Brazil;AID/W	
03/16/80-04/09/80	Morocco	R. C. Palm	Peace Corps	
04/01/80-04/22/80	Upper Volta	M. C. Johnson	AID/DSAN-C-0053	
04/01/80-04/22/80	Upper Volta	P. K. Galbreath	AID/DSAN-C-0053	
04/16/80-04/26/80	Kuwait	D. D. Moss	KISR;AID/DSAN-G-0039	
04/18/80-04/25/80	France	J. H. Grover	American Fisheries Society	
04/19/80-04/24/80	France	W. L. Shelton	American Fisheries Society	
05/03/80-05/10/80	Italy (FAO)	R. T. Lovell	AID/DSAN-G-0039	
05/12/80-05/22/80	Jamaica	M. C. Johnson	USAID/Jamaica	
05/12/80-05/23/80	Mexico	J. R. Snow	Government of Mexico	
05/19/80-06/07/80	Panama	L. L. Lovshin	AID/DSAN-C-0053	
06/01/80-06/12/80	Morocco	R. C. Palm	Peace Corps	
06/01/80-06/27/80	Colombia	R. P. Phelps	AID/LA-C-1176	
06/13/80-06/23/80	Tunisia	R. C. Palm	Peace Corps	
06/29/80-07/10/80	Rwanda	J. H. Grover	AID/DSAN-C-0053	
06/29/80-07/10/80	Rwanda	P. K. Galbreath	AID/DSAN-C-0053	
07/05/80-07/31/80	Peoples Republic/China	R. O. Smitherman	USDA & Peoples Republic/China	
07/11/80-07/15/80	Kenya	J. H. Grover	AID/DSAN-C-0053	
07/11/80-07/15/80	Kenya	F. K. Galbreath	AID/DSAN-C-0053	
07/27/80-08/02/80	Jamaica	R. P. Phelps	AID/DSAN-C-0053	
08/01/80-08/08/80	Taiwan	R. O. Smitherman	AID/DSAN-G-0039	
08/16/80-08/19/80	Panama	G. H. Jensen	AID/DSAN-C-0053	

Annex B cont'd
LIST OF SHORT TERM ICA FOREIGN ASSISTANCE

DATE	COUNTRY	STAFF	PROJECT	PER DA
10/22/79-11/02/79	Dominican Republic	L. L. Lovshin	AID/DSAN-C-0053	
10/27/79-10/31/79	Panama	E. W. McCoy	AID/DSAN-G-0039	
10/30/79-11/16/79	Indonesia	W. D. Davies	AID/DSAN-C-0053	
10/31/79-11/17/79	Honduras	E. W. McCoy	Government of Honduras	
11/01/79-11/05/79	Honduras	R. Pretto M.	Government of Honduras	
11/01/79-11/11/79	Colombia	G. L. Jensen	AID/LA-C-1176	
11/01/79-11/11/79	Colombia	P. W. Taylor	AID/LA-C-1176	
11/06/79-11/16/79	Costa Rica	B. L. Nerrie	Piscicola de Carribe	
11/09/79-11/19/79	Taiwan	J. A. Plumb	National Science Foundation	
11/11/79-11/21/79	Guatemala	G. L. Jensen	AID/DSAN-C-0053	
11/11/79-11/15/79	Honduras	E. W. Shell	Government of Honduras	
11/16/79-11/19/79	Italy (FAO)	W. D. Davies	AID/DSAN-G-0039	
11/27/79-12/18/79	Liberia	J. H. Grover	AID/DSAN-C-0053	
12/08/79-12/11/79	Kenya	J. H. Grover	AID/DSAN-C-0053	
12/09/79-12/17/79	Rwanda	R. C. Palm	AID/DSAN-C-0053	
12/12/79-12/18/79	Rwanda	J. H. Grover	AID/DSAN-C-0053	
12/18/79-12/31/79	Upper Volta	R. C. Palm	Peace Corps	
1/01/80-01/22/80	Ghana	R. C. Palm	Peace Corps	
1/12/80-01/21/80	India	B. L. Duncan	AID/ASIA-C-1177	
1/15/80-02/05/80	Panama	L. L. Lovshin	AID/DSAN-C-0053	
1/20/80-01/23/80	El Salvador	G. L. Jensen	AID/DSAN-G-0053, Peace Corps	
1/21/80-03/14/80	Indonesia	M. C. Cremer	MASI, USAID/Indonesia	
1/22/80-01/29/80	Philippines	H. R. Schmittou	AID/DSAN-C-0053	
1/30/80-02/15/80	Costa Rica	G. L. Jensen	Peace Corps	
1/30/80-02/29/80	Thailand	H. R. Schmittou	AID/DSAN-C-0053	

Annex B cont'd
LIST OF SHORT TERM ICA FOREIGN ASSISTANCE

DATE	COUNTRY	STAFF	PROJECT	PHASE
08/20/80-08/24/80	Guatemala	G. H. Jensen	AID/DSAN-C-0053	I
08/25/80-08/30/80	Colombia	G. H. Jensen	AID/DSAN-G-0039	
08/31/80-09/05/80	Italy	L. L. Lovshin	ICLARM	
09/06/80-09/12/80	Israel	L. L. Lovshin	AID/DSAN-G-0039	
09/11/80-09/19/80	Taiwan	R. T. Lovell	National Science Foundation	
09/18/80-10/05/80	Guatemala	G. H. Jensen	AID/DSAN-C-0053	
09/18/80-09/28/80	Guatemala	D. G. Hughes	AID/DSAN-C-0053	
09/21/80-10/10/80	India	H. R. Schmittou	AID/DSAN-C-0053	
09/23/80-10/04/80	Guatemala	C. R. Engle	AID/DSAN-C-0053	
09/26/80-09/28/80	Guatemala	R. Pretto M.	AID/DSAN-G-0097	
10/04/80-10/13/80	Central African Repub	R. P. Phelps	AID/DSAN-C-0053	
10/11/80-11/11/80	Thailand	H. R. Schmittou	AID/DSAN-C-0053	
10/11/80-11/11/80	Thailand	M. C. Cremer	AID/DSAN-C-0053	
10/14/80-10/22/80	Zaire	R. P. Phelps	AID/DSAN-C-0053	
10/20/80-10/25/80	Egypt	R. O. Smitherman	Marine Tech Prog for Mid East	
10/26/80-11/01/80	Israel	R. O. Smitherman	Marine Tech Prog for Mid East	
10/30/80-11/16/80	Guatemala	G. H. Jensen	AID/DSAN-C-0053	
10/30/80-11/16/80	Guatemala	L. L. Lovshin	AID/DSAN-C-0053	
11/01/80-12/15/80	Indonesia	G. M. Sullivan	AID/DSAN-C-0053	
11/11/80-11/14/80	Guatemala	R. Pretto M.	AID/DSAN-C-0053	
11/12/80-11/15/80	Philippines	H. R. Schmittou	AID/DSAN-G-0039	
12/01/80-12/06/80	Philippines	E. W. Shell	AID/DSAN-G-0039	
12/07/80-12/19/80	Indonesia	E. W. Shell	AID/ASIA-C-1177	

ANNEX C

LIST OF LDC STUDENTS TRAINED AT ICA: 1978 to 1981

NAME	COUNTRY	AWARD
March - July 1978		
Boyd, Norman Washington	Jamaica	Certificate
Gore, Gordon James	Seminole Tribe/FL	Certificate
Rodriguez, Marco Ivan	Honduras	Certificate
Fehiamona, Etienne	Central African Emp	Certificate
Sandberg, Craig Way	East Mennonite Coll	Certificate
McCharm, Eric	Nigeria	Certificate
March - July 1979		
McFarlane, Lincoln	Jamaica	Certificate
Davidson, Donald	Jamaica	Certificate
Sequiera, Ricardo	Costa Rica	Certificate
Williams, Nicholas	Sierra Leone	Certificate
Burnett, Rudolph	Guyana	Certificate
Hossain, T.	Bangladesh	Certificate
Bhuiyan, A	Bangladesh	Certificate
Khalegne, M. A.	Bangladesh	Certificate
Durve, V.	India	Certificate
Mandal, Binok	India	Certificate
March - July 1980		
Ajana, Agnes	Nigeria	Certificate
Amutio, Victor	Argentina	Certificate
Corre, Valeriano	Philippines	Certificate
Cruz, Edwin	Philippines	Certificate
Eva, Emilio	Guatemala	Certificate
Hamza, Alhaji	Nigeria	Certificate
Katisi, Editor	Botswana	Certificate
Khatoo, Peter	Guyana	Certificate
Manyemane, Judge	Botswana	Certificate
Matete, Patrick	Lesotho	Certificate
McLean, Michael	Jamaica	Certificate
Oduor, Booker	Kenya	Certificate
Sansrimahachai, Chanchai	Thailand	Certificate
Scott, George	Jamaica	Certificate
Shaw, Errol	Jamaica	Certificate
Thompson, Trevor	Jamaica	Certificate
Tomlin, Kenneth	Jamaica	Certificate
Varela, Zoel	Uruguay	Certificate

Annex C cont'd
LIST OF LDC STUDENTS TRAINED AT ICA; 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Ahmed, Elnouman B.	Sudan	01/78	cont.	M.S.
Ali, Ahyaudin B.	Malaysia	09/78	cont.	M.S/Ph.D
Al-Ahmad, Thani A.	Kuwait	09/76	cont.	M.S/Ph.D
Amaya, Rafael	Colombia	01/78	12/79	M.S.
Arce, Rudolfo G.	Philippines	09/78	06/80	Ph.D.
Arias, Plinio	Colombia	01/78	12/79	M.S.
Aristizabal, William	Colombia	09/78	03/80	Cert.
Bedawi, Rifaat M.	Sudan	01/78	cont.	M.S.
Benchakan, Manote	Thailand	03/77	03/79	M.S.
Berrios, Mario	Honduras	06/77	08/79	M.S.
Chinabut, Supranee	Thailand	09/76	06/79	M.S.
Chwang, Norman L.	Taiwan	09/77	03/79	M.S.
Durve, Vinayak	India	09/78	10/79	Post doc
Dutta, Omzo K.	India	06/75	12/79	Ph.D.
Estevez, Mario	Colombia	06/77	08/79	M.S.
Fong, Sunchio	Taiwan	09/73	08/79	Ph.D.
Fortes, Romeo D.	Philippines	03/72	08/79	Ph.D.
Garcia, Angel	Philippines	09/78	11/78	Cert.
Geraldes, Francisco	Dominican Republic	09/76	12/78	M.S.
Guevara, Eduardo	Colombia	01/77	03/79	M.S.
Hernandez, Edgar J.	Colombia	09/77	06/79	M.S.
Lau, Kui J.	Malaysia	06/77	06/79	M.S.
Lee, Jen-Chyuan	Taiwan	09/76	03/79	Ph.D.
Limsuwan, Chalor	Thailand	06/76	cont.	Ph.D.
Limsuwan, Tasanee	Thailand	06/76	08/80	Ph.D.
Lopez, Jorge	Colombia	06/78	06/80	M.S.
Mandal, Binoy K.	India	09/78	cont.	Post doc
Md. Noor, Md. Hanapi	Maylasia	06/79	cont.	M.S.
Mgbenka, Bernard O.	Nigeria	01/78	06/80	M.S/Ph.D
Moo Young, Roy R.	Jamaica	01/78	12/79	M.S.
Msiska, Orton	Malawi	08/79	06/80	Cert.
Musig, Yont	Thailand	06/77	08/79	Ph.D.
Obi, Akolisa	Nigeria	01/79	cont.	Ph.D.
Okon, Columbus	Nigeria	03/79	cont.	Spec.
Paiva, Cincinato	Brazil	03/79	cont.	M.S.
Palma, Mario	Honduras	09/77	12/78	Cert.
Pathmasothy, Soma	Malaysia	03/77	06/79	M.S.
Pawaputanon, Oopatham	Thailand	03/77	12/79	Ph.D.
Quines, Oscar D.	Philippines	09/76	12/78	M.S.
Rabegnatar, Sweta	Indonesia	09/78	cont.	Ph.D.
Rasheed, Victoria	Kuwait	09/76	cont.	M.S/Ph.D
Rodriguez, Daniel	Colombia	09/77	08/79	M.S.

Annex C cont'd

LIST OF LDC STUDENTS TRAINED AT ICA: 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Rodriguez, Ivan	Honduras	09/78	12/78	cert.
Ruiz, Luis E.	Colombia	09/77	06/79	M.S.
Rukyani, Akhmad	Indonesia	09/77	03/80	M.S.
Saad, Che R.	Malaysia	09/76	03/79	M.S.
Saeed, Mohamed D.	Sudan	06/79	cont.	Ph.D.
Sanchez, David J.	Venezuela	09/78	cont.	M.S.
Santiago, Alfredo C.	Philippines	09/76	12/79	Ph.D.
Santiago, Corazon B.	Philippines	09/76	12/78	M.S/Ph.D
Soebiantoro, Bambang	Indonesia	01/78	cont.	Ph.D.
Teran, Consuelo	Colombia	09/77	08/79	M.S.
Torres, Marco A.	Colombia	09/78	08/80	M.S.
Wahjono, Untung	Indonesia	06/77	03/79	M.S.
Williams, Stella B.	Nigeria	01/78	cont.	Ph.D.
Yoakim, E. G.	Egypt	07/78	07/79	post doc
Zarate, Mauricio	Colombia	03/79	cont.	M.S.

Annex C cont'd
LIST OF LDC STUDENTS TRAINED AT ICA: 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Ahmed, Elnouman B.	Sudan	01/78	cont.	M.S.
Al Fayadh, Sidik	Iraq	09/79	cont.	Spec.
Ali, Ahyaudin B.	Malaysia	09/78	cont.	M.S/Ph.D
Alsagoff, Abd.	Malaysia	03/80	cont.	M.S.
Al-Ahmad, Thani A.	Kuwait	09/76	cont.	M.S/Ph.D
Al-Mohamedi, Majeed	Iraq	01/80	cont.	M.S.
Amaya, Rafael	Colombia	01/78	12/79	M.S.
Arce, Rudolfo G.	Philippines	09/78	06/80	Ph.D.
Arias, Plinio	Colombia	01/78	12/79	M.S.
Aristizabal, William	Colombia	09/78	03/80	Cert.
Arrechon, Nontawith	Thailand	09/79	cont.	M.S.
Arregui, Francisco	Mexico	9/79	cont.	M.Aq.
Baragai, Vijaykumar	India	09/79	cont.	Ph.D.
Bedawi, Rifaat M.	Sudan	01/78	cont.	M.S.
Blanco, Maria	Colombia	01/80	cont.	M.S.
Brandao, Deodoro	Brazil	09/79	cont.	M.S.orPh
Chen, Dwight	Jamaica	06/80	cont.	M.Aq.
Chirwa, Harisly	Malawi	09/79	03/80	Cert.
Cisse, Adou	Ivory Coast	09/79	cont.	M.Aq.
Cooke, Sandra	Jamaica	06/80	cont.	M.Aq.
Cooper, Althea	Jamaica	06/80	cont.	M.Aq.
Cruz, Edwin	Philippines	01/80	cont.	Spec.
Durve, Vinayak	India	09/78	10/79	Post doc
Dutta, Omeo K.	India	06/75	12/79	Ph.D.
Fortes, Romeo	Philippines	03/72	08/79	Ph.D.
Gabaudan, Jacques	France	09/79	cont.	Ph.D.
Garcia, Julio	Peru	09/79	cont.	M.S.
Ikusemiju, Kolawole	Nigeria	06/80	09/80	Post doc
Lelana, Iwan	Indonesia	09/79	cont.	M.S.
Limsuwan, Chalor	Thailand	06/76	cont.	Ph.D.
Limsuwan, Tasanee	Thailand	06/76	08/80	Ph.D.
Lomo, Adjei	Ghana	09/79	cont.	M.S.
Lopez, Eduardo	Philippines	09/79	cont.	M.Aq.
Lopez, Jorge	Colombia	06/78	06/80	M.S.
Mandal, Binoy K.	India	09/78	cont.	Post doc
Maskey, Srijana	Nepal	01/80	cont.	M.S/Ph.D
Mat Diah, Nik	Malaysia	09/79	cont.	M.Aq.
Matete, Patrick	Lesotho	06/80	cont.	Spec.
Md. Noor, Md. Hanapi	Malaysia	06/79	cont.	M.S.
Mgbenka, Bernard O.	Nigeria	01/78	06/80	M.S/Ph.D
Miranda, Leandro	Chile	09/79	cont.	M.S.
Mirza, Jobad	Bangladesh	09/79	cont.	Ph.D.

LIST OF LDC STUDENTS TRAINED AT ICA: 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Moo Young, Roy R.	Jamaica	01/78	12/79	M.S.
Msiska, Orton	Malawi	08/79	06/80	Cert.
Murray, M.	Jamaica	06/80	cont.	M.Aq.
Obi, Akolisa	Nigeria	01/79	cont.	Ph.D.
Okon, Columbus	Nigeria	03/79	cont.	Spec.
Paiva, Cincinato	Brazil	03/79	cont.	M.S.
Pawaputanon, Oopatham	Thailand	03/77	12/79	Ph.D.
Rabegnatar, Sweta	Indonesia	09/78	cont.	Ph.D.
Rasheed, Victoria	Kuwait	09/76	cont.	M.S/Ph.D
Rey, Fernando	Colombia	01/80	cont.	M.Aq.
Rukyani, Akhmad	Indonesia	09/77	03/80	M.S.
Saeed, Mohamed D.	Sudan	06/79	cont.	Ph.D.
Sanchez, David J.	Venzuela	09/78	cont.	M.S.
Santiago, Alfredo C.	Philippines	09/76	12/79	Ph.D.
Soebiantoro, Bamban	Indonesia	01/78	cont.	Ph.D.
Solano, Wilfredo	Colombia	01/80	cont.	M.Aq.
Torres, Marco A.	Colombia	09/78	08/80	M.S.
Vasquez, Guillermo	Colombia	09/79	cont.	M.Aq.
Williams, Stella B.	Nigeria	01/78	cont.	Ph.D.
Yang, S. L.	Taiwan	09/79	cont.	Ph.D.
Yousef, Omer	Sudan	06/80	cont.	Spec.
Zarate, Mauricio	Colombia	03/79	cont.	M.S.

Annex C cont'd

LIST OF LDC STUDENTS TRAINED AT LDC: 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Ahmed, Elnouman B.	Sudan	01/78	cont.	M.S.
Al Fayadh, Sidik	Iraq	09/79	cont.	Spec.
Ali, Ahyaudin B.	Malaysia	09/78	cont.	M.S./Ph.D
Alsagoff, Abd.	Maylasia	03/80	cont.	M.S.
Al-Ahmad, Thani A.	Kuwait	09/76	cont.	M.S./Ph.D
Al-Mohamedi, Majeed	Iraq	01/80	cont.	M.S.
Arrechon, Nontawith	Thailand	09/79	cont.	M.S.
Arregui, Francisco	Mexico	9/79	cont.	M.Aq.
Baragai, Vijaykumar	India	09/79	cont.	Ph.D.
Bedawi, Rifaat M.	Sudan	01/78	cont.	M.S.
Blanco, Maria	Colombia	01/80	cont.	M.S.
Brandao, Deodoro	Brazil	09/79	cont.	M.S.orPh
Cagauan, Arsenia	Philippines	09/80	cont.	Spec.
Cheah, Sin-Hock	Malaysia	09/80	cont.	M.S.
Chen, Dwight	Jamaica	06/80	cont.	M.Aq.
Cisse, Adou	Ivory Coast	09/79	cont.	M.Aq.
Cooke, Sandra	Jamaica	06/80	cont.	M.Aq.
Cooper, Althea	Jamaica	06/80	cont.	M.Aq.
Cruz, Edwin	Philippines	01/80	cont.	Spec.
El Ghobashy, Hussein	Egypt	09/80	cont.	Spec.
El Shishtawy, I.	Egypt	09/80	cont.	Spec.
Ettewa, I. M.	Egypt	09/80	cont.	Spec.
Gabaudan, Jacques	France	09/79	cont.	Ph.D.
Garcia, Julio	Peru	09/79	cont.	M.S.
Ghany, Ali	Egypt	09/80	cont.	Spec.
Hafez, F. A.	Egypt	09/80	cont.	Spec.
Kan, Tim	New Guinea	09/80	cont.	Post doc
Khater, A. A.	Egypt	09/80	cont.	Spec.
Lawal, Lateef	Nigeria	09/80	cont.	Spec.
Lelana, Iwan	Indonesia	09/79	cont.	M.S.
Limsuwan, Chalor	Thailand	06/76	cont.	Ph.D.
Li, Amber	Taiwan	09/80	cont.	Ph.D.
Lomo, Adjei	Ghana	09/79	cont.	M.S.
Lopez, Eduardo	Philippines	09/79	cont.	M.Aq.
Mandal, Binoy K.	India	09/78	cont.	post doc
Maskey, Srijana	Nepal	01/80	cont.	M.S/Ph.D
Mat Diah, Nik	Maylasia	09/79	cont.	M.Aq.
Matete, Patrick	Lesotho	06/80	cont.	Spec.
Md Noor, Md Hanapi	Malaysia	06/79	cont.	M.S.
Mgbenka, Bernard O.	Nigeria	01/78	06/80	M.S/Ph.D
Miranda, Leandro	Chile	09/79	cont.	M.S.
Mirza, Jobad	Bangladesh	09/79	cont.	Ph.D.
Murray, M.	Jamaica	06/80	cont.	M.Aq.
Obi, Akolisa	Nigeria	01/79	cont.	Ph.D.

-77-
Annex C cont'd
LIST OF LDC STUDENTS TRAINED AT LDC: 1978 to 1981

NAME	COUNTRY	ENTERED	GRADUATED	DEGREE
Okon, Columbus	Nigeria	03/79	cont.	Spec.
Ozaka, Fred	Nigeria	09/80	cont.	Spec.
Paiva, Cincinato	Brazil	03/79	cont.	M.S.
Park, Kyrseck	Korea	09/80	cont.	M.S.
Rabegnatar, Sweta	Indonesia	09/78	cont.	Ph.D.
Rasheed, Victoria	Kuwait	09/76	cont.	M.S/Ph.D
Rey, Fernando	Colombia	01/80	cont.	M.Aq.
Rosenblatt, Emmanuel	Belgium	09/80	cont.	M.S.
Saeed, Mohamed D.	Sudan	06/79	cont.	Ph.D.
Sanchez, David J.	Venzuela	09/78	cont.	M.S.
Soebiantoro, Bamban	Indonesia	01/78	cont.	Ph.D.
Solano, Wilfredo	Colombia	01/80	cont.	M.Aq.
Vasquez, Guillermo	Colombia	09/79	cont.	M.Aq.
Williams, Stella B.	Nigeria	01/78	cont.	Ph.D.
Yang, S. L.	Taiwan	09/79	cont.	Ph.D.
Ye, Henre	Upper Volta	09/80	cont.	Spec.
Yousef, Omer	Sudan	06/80	cont.	Spec.
Zarate, Mauricio	Colombia	03/79	cont.	M.S.

ANNEX D
LIST OF ICA RESEARCH AND DEVELOPMENT PUBLICATIONS

<u>Number</u>	<u>Date</u>
1	September, 1972 -- Jeffrey, N. B., Progress Report on Fisheries Development in Northeastern Brazil I.
2	November, 1972 -- Davies, W. D., Progress Report on Fisheries Development in Northeastern Brazil II.
3	February, 1973 -- Sidthimunka, A., Length-weight Relationships of Freshwater Fishes of Thailand.
4	March, 1973 -- Schmittou, H. R., Artificial Spawning of Mullet and Culture of Mullet and Milkfish in Taiwan.
5	March, 1973 -- Schmittou, H. R., Aquacultural Survey in Japan.
6	February, 1974 -- McCoy, E. W., Economic Analysis of the Inland Fisheries Project in El Salvador.
7	April, 1974 -- Bayne, D. R., Progress Report on Fisheries Development in El Salvador.
8	December, 1974 -- Jensen, J. W., Progress Report on Fisheries Development in Brazil.
9	April, 1975 -- Lovshin, L. L., Progress Report on Fisheries Development in Northeast Brazil.
10	January, 1976 -- Jensen, J. W., Progress Report on Fisheries Development in Northeast Brazil.
11	November, 1976 -- Hopkins, M. L. and E. W. McCoy, Marketing of Fisheries Products by Municipal Fishermen in Panguil Bay, Philippines.
12	January, 1977 -- Parkman, R. W. and E. W. McCoy, Fish Marketing in El Salvador.
13	February, 1977 -- Parkman, R. W. and E. W. McCoy, Marketing as a Factor in Fish Culture Development in El Salvador
14	July, 1977 -- Lovshin, L. L., Progress Report on Fisheries Development in Northeast Brazil.
15	October, 1977 -- Hughes, D. G., Progress Report on Fisheries Development in El Salvador.
16	November, 1977 -- Lovell, R. T., Fish Culture in Poland.
17	February, 1978 -- Street, D. R., The Socio-Economic Impact of Fisheries Programs in El Salvador.

LIST OF ICA RESEARCH AND DEVELOPMENT PUBLICATIONS

- 18 April, 1978 -- Dourado, O. F. and W. D. Davies, Length-weight Relationships and Condition Indices of Fishes from Reservoirs of Ceara, Brazil.
- 19 August, 1978 -- Street, D. R., An Assessment of Jamaica's Fish Culture
- 20 December, 1978 -- Street, D. R., An Economic Assessment of Fisheries Development in Colombia
- 21 March 1979 -- Sevilleja, R. C. and E. W. McCoy, Fish Marketing in Central Luzon, Philippines.
- 22 April 1979 -- Boyd, C. E. and F. R. Lichtkoppler, Water Quality Management in Pond Fish Culture
- 23 April 1979 -- Cremer, M. C. and B. L. Duncan, Brackishwater Aquaculture in Northern Sumatra, Indonesia
- 24 May 1979 -- McCoy, E. W. and M. L. Hopkins, Method of Conducting a Marketing Study
- 25 November 1979 -- Crance, J. H. and D. F. Leary, The Philippine Inland Fisheries Project and Aquaculture Production Project Completion Report

In press: (27) Grover, J. H., D. R. Street and P. D. Starr, Review of Aquaculture Development Activities in Central and West Africa

(26) Malvestuto, Stephen P., R. J. Scully, and F. Garzon F., Catch Assessment Survey Design for Monitoring of the Upper Meta River Fishery, Colombia, South America

In progress are reports for Colombia, Honduras and Nigeria.

ANNEX E
COMPARISON OF AID/DSAN-C-0053 CONTRACT ACTIVITIES
FOR CALENDAR YEARS 1979 AND 1980

ACTIVITY	1979	1980	1980 INCREASE
TRAVEL			
Person days in-country	208	386	+ 85 %
Number of person trips	10	21	+ 110 %
Latin America region	(2)	(11)	
Africa region	(5)	(5)	
Asia region	(2)	(4)	
Carribbean region	(1)	(1)	
Europe region	(0)	(0)	
Number of country visits	26	26	0
Latin America region	(2)	(11)	
Africa region	(16)	(8)	
Asia region	(3)	(6)	
Carribbean region	(1)	(1)	
Europe region	(4)	(0)	
Expenditures			
Travel and transportation	\$27,229	\$53,687	+ 97 %
Salaries	24,386	51,739	+ 112 %
Average in-country cost per day	\$ 248.14	\$ 273.12	+ 10 %

In comparing the demand for AID/DSAN-C-0053 contract funded services for 1979 and 1980, a substantial increase in technical services activity is evident for 1980. Person-days in-country for technical consultancy increased 85%, from 208 days in 1979 to 386 days in 1980. Although the number of country visits did not increase from 1979 to 1980, the number of individual person trips to visit these countries increased 110%, from 10 in 1979 to 21 in 1980. Related travel and salary costs increased proportionally with the increased time spent in-country and the increased number of person trips. Travel and transportation expenditures increased 97%, from \$27,229 in 1979 to \$53,687 in 1980. Salary expenditures increased by 112%, from \$24,386 in 1979 to an estimated \$51,739 in 1980. These expenditure increases primarily reflect an increase in demand for technical services, as the average cost per person-day in-country rose by only 10%, from \$248.14 in 1979 to \$273.12 in 1980. Other correlations can also be drawn which reflect the substantial increase in services costs, including a 100% increase in 1980 trips to the Asia region and a 550% increase in 1980 trips to the Latin American region.

931-1314

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT AUTHORIZATION AND REQUEST
FOR ALLOTMENT OF FUNDS PART I

1. TRANSACTION CODE

A
A = ADD
C = CHANGE
D = DELETE

PAF

2. DOCUMENT CODE
5

3. COUNTRY/ENTITY S&T/AGR/RNR

Type C. Field Service

4. DOCUMENT REVISION NUMBER

1 2

5. PROJECT NUMBER (7 digits)

931-1314

6. BUREAU/OFFICE

A. SYMBOL

B. CODE

S&T

10

7. PROJECT TITLE (Maximum 40 characters)

Aquaculture Technology Development

8. PROJECT APPROVAL DECISION

ACTION TAKEN

A = APPROVED
 D = DISAPPROVED
 DE = DEAUTHORIZED

9. EST. PERIOD OF IMPLEMENTATION

YRS. 1 5 10
QTRS. 0 3 6 9

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. THRU		H. 1st FY		I. 2nd FY	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	J. GRANT	K. LOAN	L. GRANT	M. LOAN
(1) ARDN	149I	077	-	1,459	-	360	-	425	-
(2)									
(3)									
(4)									
TOTALS				1,459	-	360	-	425	-

A. APPROPRIATION	H. 3rd FY		I. 4th FY		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED (\$000)	GRANT	LOAN
	O. GRANT	P. LOAN	N. GRANT	S. LOAN	T. GRANT	U. LOAN			
(1) ARDN	440	-	1,075	-	3,759	-	ENTER APPROPRIATE CODE(S) 1 = LIFE OF PROJECT 2 = INCREMENTAL LIFE OF PROJECT		
(2)									
(3)									
(4) TOTALS	440	-	1,075	-	3,759	-			

C. PROJECT FUNDING AUTHORIZED THRU
FY 8 6

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

A. APPROPRIATION	B. ALLOTMENT REQUEST NO.	
	C. GRANT	D. LOAN
NA		
(1)		
(2)		
(3)		
(4) TOTALS		

13. FUNDS RECEIVED FOR ALLOTMENT

NA

TYPED NAME (Last, First/Middle)

SIGNATURE

DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES

000 541 LOCAL OTHER

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

The amendment extends the life-of-project by five (5) years (from January 1, 1982 to December 31, 1986) and will require additional funding of \$2,300,000 thereby raising the authorized life-of-project costs from \$1,459,000 to \$3,759,000.

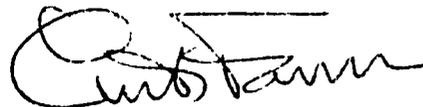
FOR PROPRIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE	18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE
		MM DD YY		MM DD YY

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

ENTITY: Bureau for Science & Technology
PROJECT TITLE: Aquaculture Technology Development
PROJECT NUMBER: 931-1314

1. I hereby authorize grant funds totaling \$2,300,000 for an extension of five (5) years (from January 1, 1982 to December 31, 1986) of the field service project on "Aquaculture Technology Development" as outlined in the attached Project Paper.
2. It is intended to implement this project extension by a Cooperative Agreement to be negotiated non-competitively with Auburn University.
3. Of the total \$2,300,000 requested in this extension \$2,250,000 will be provided to Auburn to support activities in international aquaculture. The remaining \$50,000 is for two in-depth team evaluations scheduled to be conducted in July 1983 and January 1985 and each costing an estimated \$25,000 at a maximum.
4. This project extension will be incrementally funded in FY82 with \$360,000, in FY83 with \$425,000, in FY84 with \$440,000, FY85 with \$525,000, and in FY86 with \$550,000 depending on the availability of funds.

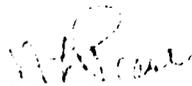
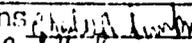
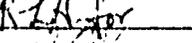
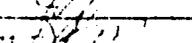
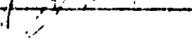


Curtis Farrar
Acting Senior Assistant Administrator,
Bureau for Science & Technology
Date: 9.14.81

References:

- Action Memo, Fiester to Farrar (attached)
- Project Paper for this extension (attached)
- Environmental Threshold Determination (attached)
- Minutes of Project Review Committees (attached)
 - (1) S&T/AGR Review on 11/14/80
 - (2) TPCA Subcommittee clearances included in memo dated 9/4/80 based on Subcommittee's Review on 7/28/80.
 - (3) TPCA Subcommittee Review on 2/2/81

Clearances:

S&T/AGR/RNR, NPease		Date	<u>10/1/81</u>
S&T/AGR/RNR, CSinkins		Date	<u>11/10/81</u>
S&T/AGR, MZozynski		Date	<u>7/29/81</u>
S&T/AGR, KMcDermott		Date	<u>7/29/81</u>
S&T/AGR, DFiestor		Date	<u>7/29/81</u>

AFR/DR, LHeilman	<u>ALB</u>	Date	<u>4 Aug 81</u>
NF/TECH, LReade	<u>LR</u>	Date	<u>3 Aug 81</u>
ASTA/TR, TArndt	<u>ACW NED</u>	Date	<u>3 Aug 81</u>
LAC/DR, TCauterucci	<u>TC</u>	Date	<u>3 Aug 81</u>
S&T/PO, ASilver	<u>AS</u>	Date	<u>12 Aug 81</u>
S&T/PO, BChapnick	<u>BC</u>	Date	<u>4/5</u>
PPC/PPPR, JEricksen	<u>JE</u>	Date	<u>4/5</u>

ENVIRONMENTAL THRESHOLD DETERMINATION

SEP 4 1981

TO: AA/S&T, Curtis Farrar (Acting)
FROM: S&T/AGR, Donald Fiester
SUBJECT: Environmental Threshold Determination For:

Project Title: Aquaculture Technology Development
Project Number: 931-1314
Specific Activity: Field Service Project
Reference: Initial Environmental/Examination (IEE)
contained in PP for subject project on page 16.

On the basis of the Initial Environmental/Examination (IEE) referenced above and attached to this memorandum, I recommend that you make the following determination:

- 1. The proposed agency action is not a major Federal action which will have a significant effect on the human environment.
- 2. The proposed agency action is a major Federal action which will have a significant effect on the human environment, and:
 - a. An Environmental Assessment is required; or
 - b. An Environmental Impact Statement is required.

The cost of and schedule for this requirement is fully described in the referenced document.

- 3. Our environmental examination is not complete. We will submit the analysis no later than _____ with our recommendation for an environmental threshold decision.

Approved Curtis Farrar

Disapproved _____

Date 9.14.81

Clearance:

S&T/AGR/RNR, NPease	<u>N. Pease</u>	Date	<u>7/29/81</u>
S&T/AGR/RNR, CSimkins	<u>C. Simkins</u>	Date	<u>7/29/81</u>
S&T/AGR, MZozynski	<u>M. Zozynski</u>	Date	<u>7/29/81</u>
S&T/AGR, KMcDermott	<u>K. McDermott</u>	Date	<u>7/29/81</u>
S&T/PO, Silver	<u>Silver</u>	Date	<u>9/2/81</u>
S&T/PO, BChapnick	<u>B. Chapnick</u>	Date	<u>9/5</u>

B. ENVIRONMENTAL IMPACT

Initial Environment Examination. The activities of this project fall into the area described in Environmental Procedure Regulations, Para. 216.2 (c) "Analyses, Studies, Academic or Investigative Research. Workshops and Meetings." These classes of activities will not normally require the filing of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be a set of procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes training and technical assistance directly supportive of USAID and host country activities. Under these guidelines this activity clearly qualifies for a negative determination at the time when a threshold decision is determined.

To the extent that pesticides may be used for the preservation of fish, ICA will comply Rule 16 on Environmental Procedures.

Date: AUG 5 1981

ACTION MEMORANDUM FOR THE ACTING SENIOR ASSISTANT ADMINISTRATOR, BUREAU FOR SCIENCE AND TECHNOLOGY

FROM: S&T/AGR, Donald R. Fiestera 

Problem: Your approval is required for a five (5) year extension of the field service project on "Aquaculture Technology Development" which will require funds totaling \$2,300,000.

Discussion: In 1967 Auburn University, at the request of A.I.D., signed a three year General Services Contract and a Basic ordering Agreement which funded core support and technical assistance in aquaculture for LDCs. From 1970 to 1978 a \$1,600,000 211 (d) Grant was awarded to Auburn and its International Center for Aquaculture (ICA) to strengthen its aquaculture program in respect to the LDCs. In 1978, a new three year S&T/AGR project was approved and implemented by Auburn through two components: (1) a grant for core support of their educational and outreach program to the LDCs; and (2), a contract for technical assistance/field service to AID missions and LDC institutions. A total of \$1,439,000 has been obligated to these combined components, both of which will terminate on December 31, 1981. In addition to S&T/AGR's substantial contribution to Auburn's International Center for Aquaculture through past funding, it should be noted that the total ICA operating budget has been augmented significantly by other sources including the Rockefeller and Kresge Foundations, USDA, the National Science Foundation (NSF), the State of Alabama, private industry and other non-AID sources. Currently AID is contributing only 25 per cent of ICA's total operating budget.

The attached project paper outlines a 5 year project extension to be implemented by a Cooperative Agreement requiring total funds of \$2,250,000.* The goal of this project extension is to improve the availability of inexpensive animal protein for low income populations by increasing the production of fish in remote areas of underdeveloped countries. The purpose of the project is to increase fish production in man-made ponds and natural and man-made waterways. To achieve this purpose, the International Center for Aquaculture (ICA) will provide assistance to LDC institutions, provide training at the graduate level and other special training courses; hold workshops and seminars, disseminate instructional information and reference material, bulletins and training manuals and conduct certain research activities for the development of institutional capacities in LDCs and USAIDs (for additional information, please refer to the project paper, pages 31-34).

The most recent In-depth Evaluation Team went to Auburn in February 1980 and found that the funds provided to the current grant and contract were successfully achieving their purpose. Under the grant, the Team said, a strong educational program is being implemented in aquaculture for 48 graduate students from 25 foreign countries with the educational program directed toward their own country needs. A three-month practical training course in warm-water

*NOTE: An additional \$50,000 is included in the total project extension costs and will be set aside for S&T/AGR's use in conducting two indepth team evaluations of the project in FY83 and FY85.

aquaculture is also provided each summer to LDC students. Last year 30 students were enrolled. Practical and informative aquaculture manuals and bulletins are being regularly prepared for the transfer of technology to government implementing officers and small-scale fishfarmers in the LDCs. Technical services were provided in project development, project planning and feasibility studies on 20 separate trips, at the request of USAID Missions. The team also pointed out the need for long-term core support and recommended that AID continue this assistance for the effective utilization of the expertise developed at Auburn.

The Project Paper for this-5-year extension (attached), to be implemented through a Cooperative Agreement with Auburn, has been reviewed extensively since mid-1980 and several suggestions have been made which has strengthened the document. All Bureaus and the TPOA have recommended approval of this extension of the Aquaculture Technology Development Program.

Recommendation: That you approve this extension for the project on "Aquaculture Technology Development" by signing the attached PAP and Environmental Threshold Determination.

Attachments: a/s

Clearances:

S&T/AGR/RNR: C. Simkins: Chuck A. Simkins Date 29 July 1981
S&T/AGR/: M. Mozynski RAH for Date 7/29/81
S&T/PO: B. Chapnick BC Date 9/5

Aquaculture Technology Development - DS/AGR Review

Attendees: William Rodgers
Ralph Hanson
Fred Whittemore
Charles Simkins
Mary Mozynski
Charles Breintebach

Mr. William Rodgers chaired the second DS/AGR review of the Aquaculture Technology Development project which was held on November 14, 1980.

Ken McDermott requested that the following issues be raised. He was unable to attend the review:

The demand for training at the level requested.

Charles Brientebach stated that the requests for training far exceed the space available at Auburn. Auburn is one of the universities who trains the highest level of LDC participants in the U.S.

Are there sufficient funds for Technical Assistance? The scope of work shows 16 man-months per year which will handle only about 8 countries. Note that on page 15, the data shows a heavier use.

Charles Brientebach stated that the International Center for Aquaculture uses funds from other sources to provide technical assistance and in addition, the Missions pay for TDY trips over 30 days.

On page 6, the statement is made that ICA is 'independent of A.I.D. How is this possible?

Charles Brientebach stated that under a cooperative agreement, A.I.D.'s contribution is to the core budget and that DS/AGR is assisting Auburn to extend its program to the developing world. That A.I.D. is contributing only approximately 25 percent of the annual budget for ICA which covers only the international side of the program at Auburn.

It must be understood that ICA constitutes only a portion of the Auburn University Department of Fisheries which provides training for U.S. aquaculture students, undertakes research on fish production and carried out a large extension program for U.S. fish farmers which is funded by the State of Alabama and the Federal Government.

The review team recommended that a statement on the financial arrangements of the University and the ICA be added to the Summary statement at the beginning of the paper.

How many graduate students have received degrees?

Charles Breitenbach stated that this is covered in the back of the paper.

Fred Whittemore questioned what happens to the fish after they are raised. What is the linkage from the production side to the processing and marketing of the fish?

Charles Breitenbach stated that this project deals primarily with pond culture and the fish produced are consumed primarily by the farm families and the local community.

Fred Whittemore asked about the use of pesticides for the preservation of fish and what Auburn is doing about this problem.

Charles Breitenbach responded that under a separate contract with the African Bureau, Auburn is preparing a manual of environmental conditions which affect fish production and consumption. The use of pesticides will also be covered in this manual.

A discussion followed on this subject and it was recommended that the following be included as a second paragraph under the 'Initial Environment Examination' on page 15:

"To the extent that pesticides may be used for the preservation of fish, ICA will comply with Rule 16, Environmental Procedures."

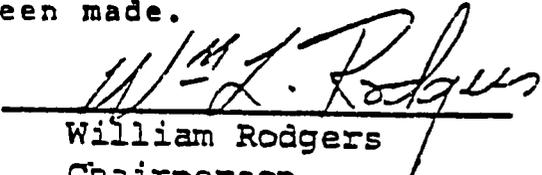
Charles Simkins asked where the graduates of this Center are currently working.

Charles Breitenbach responded that he will obtain this information from ICA, but that this is privileged information and not for public distribution and thus should not be attached to the project paper.

Mary Mozynski asked that a section be added on the impact of the activity on Women in Development. In the reporting section, that ICA be asked to submit a report on success stories as they are take place.

Charles Breitenbach stated that he had already written the above into the project paper.

Recommendation: The team recommended that the project paper be presented to the TPCA full committee at the earliest date possible after the above changes have been made.



William Rodgers
Chairperson

DS/AGR:MMozynski
11/14/80

September 4, 1980

MEMORANDUM

TO: ASIA/TR, Edward (Pete) Williams

FROM: DS/AGR/RNR, *C. A. Breitenbach*
C. A. Breitenbach

SUBJECT: TPCA Approval of the Project Proposal with Auburn University, "Aquaculture Technology Development and Assistance."

The Issue:

We are anxious to obtain approval of the subject project proposal. The current AID aquaculture program at Auburn University will terminate on April 30, 1981. It is hoped the new program as described in the attached project paper can be implemented to go into effect on May 1, 1981 without an interruption of activities. To do this it will be necessary to have the new project considered by the governing board of the TPCA as quickly as possible.

Discussion:

At the last meeting of the TPCA Sub-Committee on Fisheries, on July 28, 1981, general agreement was reached to endorse the Aquaculture Technology Development and Assistance project proposal. The Committee members: Douglas Caton of PPC/PDPR, Pete Williams of ASIA/TR, Richard Hughes of LAC/DR, Boyd Whittle of AFR/DR and John Swanson, representing Robert Morrow of NE/TECH, made a number of recommendations for improving the proposal. It was felt that upon the incorporation of these, they could give their assent to bring the project proposal to the TPCA Board. It was also agreed that DS/AGR/RNR would edit the proposal in regard to the new recommendations and then submit a final draft to the Sub-Committee members.

The project paper herewith submitted contains the recommendations of the Sub-Committee on Fisheries. I hope they achieve the purpose of your comments. For myself I find that they greatly improve this version over previous drafts. If you are not in agreement, I would be pleased to call a joint session of the Sub-Committee to answer any questions on the project which may still be of concern. Either way the primary purpose of this document is to facilitate the presentation of the proposal to the TPCA. Toward that end I am sending this memorandum individually to each member of the Sub-Committee.

Recommendation:

That you sign as indicated below your clearance of the proposed project at Auburn University: "Aquaculture Technology Development and Assistance." Please return this form to me at DS/AGR/RNR by September 12, 1980. We anticipate that your help in this will facilitate early presentation of the project before the TPCA board.

Cleared _____ date 9/11/80

AFR/DR

Not Cleared _____ date _____

[Faint, illegible handwritten notes or signatures]

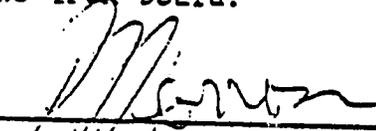
Attachment: a/s

The requests for services from Africa seem to be too few to justify these services for that Region. In any case the Project is good and no doubt there will be further requests from the Africa Missions.

/s/ Boyd Whittle

Recommendation:

That you sign as indicated below your clearance of the proposed project at Auburn University: "Aquaculture Technology Development and Assistance." Please return this form to me at DS/AGR/RNR by September 12, 1980. We anticipate that your help in this will facilitate early presentation of the project before the TPCA board.

Cleared  date 9/2/80
NE/TECH

Not Cleared _____ date _____

Attachment: a/s

Recommendation:

That you sign as indicated below your clearance of the proposed project at Auburn University: "Aquaculture Technology Development and Assistance." Please return this form to me at DS/AGR/RNR by September 12, 1980. We anticipate that your help in this will facilitate early presentation of the project before the TPCA board.

Cleared *Edward H. Williams* ASIA/TR/date *9/3/80*
ASIA/TR

Not Cleared _____ date _____

Attachment: a/s

Recommendation:

That you sign as indicated below your clearance of the proposed project at Auburn University: "Aquaculture Technology Development and Assistance." Please return this form to me at DS/AGR/RNK by September 12, 1980. We anticipate that your help in this will facilitate early presentation of the project before the TPCA board.

Cleared *P. Warren* date 9-10-80
 LAC/DR

Not Cleared _____ date _____

Attachment: a/s

SEP 12

memorandum

DATE: February 4, 1981

REPLY TO
ATTN OF: DS/AGR/RNR, Norman L. PeaseSUBJECT: Minutes of meeting of TPCA Sub-Committee on Fisheries and Aquaculture--
Auburn contract renewal.

TO: DS/AGR/RNR, Charles Simkins

The meeting scheduled for February 2, 1981 was to discuss modifications made to new contract extension with Auburn University.
Attendees were:

LAC	Robert Castro
NE	Jeffrey Lee
AFR	David Schaer
ASIA	Ed Williams
DS/AGR	C. Simkins
DS/AGR	N.L. Pease

The modifications were reviewed and accepted.

Discussions followed during which all Bureaus indicated their appreciation of Auburn's prompt response to requests for assistance. From early information received by Bureaus on projects being developed in Africa and Asia, those Bureaus are of the opinion that demands for Auburn's technical assistance will be increasing. The Asia Bureau also indicated there will be a need to increase Auburn's training efforts in several countries in that region.

The bureaus generally rejected the program office suggestion that Missions provide the technical assistance funds to Auburn. This is not acceptable because Auburn could not maintain its present staff nor could it respond so rapidly and with such dedication without an annual budget to operate on.

The attachment in memorandum form was prepared for use within the Bureaus.

cc: All Attendees
DS/AGR, Mary Mozynski
DS/AGR, R. Hughes
DS/AGR, J. Walker
DS/DAA, S. McCarthy



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

memorandum

DATE: February 4, 1981

REPLY TO
ATTN OF: Bureau Representative

SUBJECT: Auburn Aquaculture Technology Development Program, 5 Year Renewal

TO: Bureau Chief

After extensive review by the TPCA sub-committee on fisheries it is our conclusion and recommendation that the project be approved in its current form (\$2.1 million and 5 years). Any decrease in this programs funding would mean a severe reduction in critical core staff and training by Auburn.

There has been an exponential increase in the demands for Auburn's services during the terms of the current project and it is apparent that an increased requirement for these services will continue in all Bureaus during the terms of the new contract.

It has been suggested by the Program Office that Auburn's Technical Assistance Services should be cut in DSB and picked up by Mission funding. This is not acceptable because Auburn could not maintain its excellent internationally experienced staff at the desired level and also their rapid response capability would be lost.

Auburn's extensive experience in technical assistance, U.S. and in-country training, has proven to be one of the most cost effective tools in LDC development.

RECOMMENDATION

That you present the above position to the TPCA at your earliest convenience and recommend speedy approval of the Aquaculture Technology Development Program at full funding.

