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WASHINGTON, D. C. 20523
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ARDA

8

| | | |
|---------------------------|--|------------------|
| 1. SUBJECT CLASSIFICATION | A. PRIMARY Serials | Y-AM00-0000-0000 |
| | B. SECONDARY Food production and nutrition--Fisheries | |

2. TITLE AND SUBTITLE
Annual report for 1976/1977

3. AUTHOR(S)
(101) R.I.Univ. Int.Ctr.for Marine Resource Development

| | | |
|--------------------------|----------------------------|----------------------|
| 4. DOCUMENT DATE 1977 | 5. NUMBER OF PAGES 66p. | 6. ARC NUMBER ARC |
|--------------------------|----------------------------|----------------------|

7. REFERENCE ORGANIZATION NAME AND ADDRESS
R.I.

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Activity summary)

9. ABSTRACT

| | |
|--|--|
| 10. CONTROL NUMBER PN -AAG-215 | 11. PRICE OF DOCUMENT |
| 12. DESCRIPTORS Aquaculture Research | 13. PROJECT NUMBER 931011300 |
| | 14. CONTRACT NUMBER CSD-2455 211(d) |
| | 15. TYPE OF DOCUMENT |

1976-77
Annual Report

International
Center for
Marine Resource
Development

University of Rhode Island



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ANNUAL 211(d) GRANT REPORT, 1976-1977

I. REVIEW

Date Due: December 1, 1977
Date Submitted: September, 1978
Report Period: July 1, 1976-August 31, 1977

Grant Title: Institutional Development Grant
AID/csd 2455

Grantee: The University of Rhode Island
International Center for Marine Resource
Development
Kingston, R. I. 02881

Grant Program Director: Dr. Gerald A. Donovan

AID Supporting Technical Office: TAB

Statistical Summary

Period of Grant: May 7, 1969 - August 31, 1977
Amount of Grant: \$1,375,000.00
Expenditures for Report Period: \$ 328,332.68
Accumulated: \$1,372,944.02
Anticipated for Next Year (1978): \$ 290,000.00

II. NARRATIVE SUMMARY

A. Preface

The University deeply regrets that the submission of this Annual Report has been unduly delayed, caused by a number of factors, several of which -- such as illness and prolonged staff vacancies -- were beyond the University's control.

It is hoped that this delay may be mitigated to some extent by the prompt submission by the University of the required State-of-the-Art papers or related reports following the termination of the extension. In addition, there was continuing informal reporting throughout the Grant period regarding progress being made in the program which, together with the recommendations of the AID Mid-Extension Review Team Report of November 16, 1976, appear to have led to the \$50,000 increase in the Grant during the period covered by this report. Finally, on September 11, 1977, the University submitted a Proposal for a two-year, \$635,000 extension of the Grant which was approved and became effective September 1, 1977.

These activities do not substitute for the submission of the Annual Report in accordance with the Grant requirements but they do at least indicate the level of intent, goodwill and communication throughout the period covered by this report.

B. Summary

The five principal projects were completed during the Grant reporting period, July 1, 1976, to August 31, 1977, and the State-of-the-Art papers resulting from these projects were submitted to AID soon after the program ended. The Grant was to have terminated on June 30, 1977, but, because of delays encountered in the approval of the two-year, \$635,000 extension (which became effective September 1, 1977), a non-cost, two-month extension to August 31, 1977, was authorized.

The University responded to requests by AID by sending Professor Harlan Lampe to Egypt to assist in the evaluation of fisheries in that country, and by sending Mr. Lars Vidaeus, a doctoral candidate in Resource Economics, to Sierra Leone for the same purpose. Linkages between the University and the University of Costa Rica were strengthened by the teaching of an evening fisheries course (in Spanish) by Dr. David Stevenson, a Co-Investigator on one of the five projects.

He and Dr. Jon Sutinen also enhanced the cooperation between the University and the Department of Marine Fisheries of the Ministry of Agriculture and Livestock of Costa Rica (under whose auspices the Grant projects were carried out) by assisting in a survey of the Costa Rican herring industry. A URI team completed a feasibility study for a possible program of AID assistance to the new University Institute of the Azores (later contracted to URI).

The ICMRD Library continued to add to its unique collection and to meet an ever-increasing number of requests for marine resource material from at home and abroad. Structural changes in the new wing of the University's Library were agreed on (at no cost to the Grant) in order to accommodate the ICMRD Library, which has now moved.

III. DETAILED REPORT

A. General Background and Description of the Problem

The basic problem faced in most developing nations is an adequate food supply; in many of the LDCs fisheries resources constitute one of the most available and economic sources of protein for the inhabitants. Aquatic foodstuffs are nutritionally equal to meat in protein but low in saturated fats; in addition, these foods supply many essential amino acids and minerals. Fish are not only a valuable source of nutrients; they are also efficient feed utilizers and, in comparison to livestock, do not compete with land animals or humans for feed since they are largely sustained by aquatic food sources.

In developing countries the small-scale fishermen catch most of the fish consumed locally; it is estimated that as much as half of all the food fish produced in the world is caught by small-scale fishermen or grown in local fish ponds. A "small-scale" or "artisan" fisherman has been defined with reference to large-scale operations. Artisanal fishing is a low-investment, high-labor operation. Normally, the small-scale fisherman fishes along coastal areas, although it is not possible to be geographically-specific and state that fishing operations are conducted within "X" miles of a coastline.

Individually, the catch may be small; however, FAO (the Food and Agriculture Organization of the United Nations) estimates that there are between 20 and 30 million small-scale fishermen in the world and that at least 150 million people in the fishermen's families depend on artisan fishing for a livelihood and nearly 200-250 million people are directly or indirectly dependent upon small-scale fisheries. The importance of the sector has been acknowledged by governments, international agencies and development groups.

To meet world food needs and improve the lot of the fishermen a great improvement in this sector is needed. It has been estimated that only \$6 million is currently being spent annually on small-scale fisheries and much of that not efficiently (Paris, OECD, 1976: Economic State and Problems of Small-Scale Fisheries). One fundamental problem is the lack of information on which to base projects. The second big problem, it has been pointed out, is:

"...the lack of experience and knowledge to translate the theory into practice. This great chasm between the lofty ideals and the realities the doer faces, between what it would be nice to do and what is achievable out there on the beach with the canoes, has struck me. Development can mean the technical achievement only, but what it is we're after in all of this is a better-fed (artisanal) fisherman with opportunities to participate in the benefits of the more modern society surrounding him." (OECD, ibid., p. 97.)

Because of the involvement of the International Center for Marine Resource Development in activities relating to the artisan sector it was natural that it would create a multi-faceted program in that aspect of marine fisheries. With the assistance of the AID professional fisheries staff, a program was developed to improve the knowledge base to allow for realistic project design and evaluation, fisheries development, management, and policy formulations. The sub-projects proposed under the grant involved cooperation with governments in developing countries, including nations in Central America and Africa. These countries were chosen because they were typical, prior contacts had been made with officials there who indicated there would be cooperation, and University staff had some knowledge of specific needs and problems of the regions. In only one case were difficulties encountered because of international political problems, which resulted in the transfer of the project to another area.

B. Purpose of the Grant

The 1975-1977 extension to the basic 211(d) grant was awarded to the University in order that an "integrated" small-scale fisheries development program might be implemented, with suitable adaptations, in selected developing countries.

Corollary objectives included a long-range focus of ICMRD and a further upgrading of the quality of the University's response capability.

C. Objectives of the Grant

1. Objectives Restated

a. Extended Knowledge Base

Grant funds were to be used for background studies of identified aspects of small-scale fisheries. State-of-the-Art papers were to be prepared as a result of the in-depth studies and these papers would record existing literature and methods of artisan fishing.

b. Response Capability

Research and on-site projects will further improve the University's ability to respond to requests for technical assistance in behalf of the developing countries.

c. Information Capacity

Funds and facilities will be made available to expand the resources of the ICMRD Library in order to serve Principal Investigators and staff working on specific projects or broad programs. These improvements will also increase the ability of the staff to respond to requests for technical information received from outside the University.

d. Education and Training Capability

In addition to the special training courses already developed for LDC fisheries administrators, the studies envisioned in this program will provide up-to-date course material for use at home and abroad.

The questions to be addressed in the studies would include: (1) what would be the most efficient techniques for assessment of fisheries resources in specific regions; (2) what new techniques might be introduced to facilitate such assessment of stocks and how might these techniques be successfully taught; (3) what are the institutional constraints and decision-making systems which influence the

growth of the artisan sector; (4) how might new techniques for preservation of fish and food products be introduced; (5) how does infrastructure limit efficiency of distribution systems; and (6) what are the costs and availability of fishermen's supplies. In addition to such specific problems it was hoped that the research planned under this grant might result in the development of models of economic aspects and resource projections and improvement of processing techniques and technology which would have general rather than specific value. The sociocultural studies planned were also based on local situations with transference possibilities.

2. Review of Objectives

The objectives defined in the foregoing have been substantially achieved with the exception of the program involved in the sub-project "Institutional Constraints." It is planned to include this sub-project, with modifications, in the 1977-1979 grant. The emphasis will be altered slightly to stress the importance of the decision-making process within governments and their agencies. The objective will remain basically the same; that is, how governments and agents can be persuaded to assist small-scale fishermen to increase production and how the distribution/marketing infrastructure can be improved by government investments in facilities without regulatory constraints.

Delays were encountered on Project No. 3, "Underutilization of Food Technology," due to misunderstandings as to the nature and extent of the work of the Food Research Institute of Ghana. A considerable amount of time and man-power was spent in resolving these problems. Once settled, a report was prepared by the Principal Investigators and the Research Associate, "Underutilization of Food Technology Resulting in Losses of Available Food in West Africa," which has generated considerable interest. The demand has been such that additional copies have been made. A unique aspect of this project is that the basic research and most of the drafting of the report was done by or under the Research Associate, Dr. Matthew Caurie, a Ghanaian, who earned his Ph.D. in Food Science and Technology at URI. Dr. Caurie was able to adapt modern food technology to the ancient tribal methods of preserving fish by hot smoking, thereby creating a product of better quality and longer shelf life while at the same time using a process acceptable to the native producer.

With respect to the objectives involved in improving response capability and enhancing information capacity the proof of such success is indicated by the increased number of requests made by AID and other agencies for assistance with specific on-site projects, and the numerous requests for information received from foreign governments and individuals as well as from U. S. sources. The Librarian has been responsible for the distribution of staff publications and supervised the preparation and printing of the Proceedings of the Central American conference.

On a more general level, there has been increased enrollment in all marine-related programs at the University and a number of new courses and specializations have been introduced, particularly in aquaculture, marine affairs and marine resource economics. Scholarships from international organizations, such as FAO and IOC (the Intergovernmental Oceanographic Commission), and stipends from governments, as well as support from U.S. sources, have enabled foreign students to attend URI.

3. Review of Critical Assumptions

The need for work in the artisan fisheries sector has been acknowledged by international groups as well as national governments. However, to be effective these projects must have the full cooperation of the people involved as well as the governments. As will be seen in the detailed analyses of the individual projects, such cooperation has, on the whole, been forthcoming and will insure the continuation of many of the projects when Center activity ends. Two sub-projects did encounter difficulties; one of these was subsequently deferred and a great deal of time was lost on the other. More consideration must be given to the political situation and/or the government structure in those countries where it is proposed to locate a project in order to insure that its objectives can be achieved within the time allowed.

The ICMRD experience during the past year demonstrates the importance of the studies being conducted under this grant. Specific knowledge has to be acquired before valid changes can be made in operations. Further, all of these activities are inter-related and the effectiveness has been enhanced by the team nature of the undertaking. In Costa Rica, Dr. Stevenson, Co-Investigator on the Resource Assessment Project, and Dr. Sutinen, one of the Principal Investigators of the

Economics Project, presented two workshops to acquaint government officials and staff from the University of Costa Rica with the result of their undertakings and trained them in techniques for maintaining activities. Such integration will not only be beneficial for the University's performance but will achieve most results for the small-scale fishermen in Costa Rica.

IV. ACCOMPLISHMENTS

Each project has progressed according to the schedule set forth in the work plans, which were revised in June 1976, with the exception of the delays encountered with Project No. 3 dealing with the "Underutilization of Food Technology" in Ghana and Project No. 4, "Knowledge Transfer Methodology for Small-Scale Fisheries," the focus of which was shifted. Part of Project No. 5, "Economics of Small-Scale Fisheries," dealing with institutional constraints in governments was not initiated because of lack of manpower. It was established as a special project in the two-year extension beginning September 1, 1977, and is now well underway. Details about specific activities are given below.

A. Objective/Output No. 1 - Extended Knowledge Base

1. Small-Scale Fisheries and Aquaculture

a. Lack of Knowledge of Available Fish Stocks

Project No. 1 - Assessment of Resource Base
for Small-Scale Fisheries

Principal Investigator - Saul B. Saila
Co-Investigator - David K. Stevenson

Narrative Description

The objective of this study was to develop a system of data collection and analysis which would permit rapid first-order evaluations of fishery resources harvested by artisan fleets in the LDCs. The methodology to be tested in Costa Rica during the period July 1976-June 1977 involved the estimation of parameters (growth and mortality rates) from length frequency data collected from a sampling survey of commercial landings in Puntarenas, the principal landing site on the Gulf of Nicoya. Additional useful information (such as catch and effort data) was to be collected by the same technique. All field work was to be conducted with

the collaboration of the Department of Marine Fisheries, Ministry of Agriculture and Livestock.

The objective of the study was the application of growth and mortality rates to a modified version of the Beverton-Holt yield model. The model, when applied to individual species, generates an estimate of maximum sustainable yield per recruit, thus providing the basis for the rational management of available fishery resources within a relatively short time-frame. The theoretical basis of the model permits its use in the absence of absolute age information. Such is the case with tropical species which cannot be reliably aged by conventional techniques (e.g., growth rings on scales).

The data collection system was designed to be as simple and straightforward as possible. By sampling commercial landings, other more expensive and time-consuming methods (e.g., exploratory fishing, tag and recapture methods) were deferred, at least for the reporting period. The ultimate goal of the work in Costa Rica was to design a system of data collection which would be compatible with economic analyses and would be transferable to artisan fisheries in other LDCs. Another goal was to produce a manual of stock assessment methods for the development and management of tropical small-scale fisheries, based on experiences in Costa Rica.

Targets for Reporting Year

1. A State-of-the-Art paper was to be written detailing the theoretical bases for stock assessments of tropical fishery resources and describing previous attempts to evaluate fishery resources in tropical LDCs. This study was to concentrate on methods which have been used or proposed to assess tropical fishery resources and their application to the management of those resources.
2. It was hoped that one year of data collection would provide sufficient information to permit an adequate testing of the sampling methods, the analytical techniques and the yield model.
3. A preliminary analysis was planned of some portion of the landings data to determine their suitability for resource assessment and to identify possible problems.

Accomplishments

Accumulative

1. A draft version of the State-of-the-Art study was completed and distributed for review and comments.
2. Over 40,000 individual length measurements were made during 1,400 sampling occasions for approximately 12 species common to the artisan fishery in the Gulf of Nicoya.
3. Preliminary analyses on these length measurements were begun.

Reporting Year

1. Data collection of the twelve species common to the artisan fisheries of the Gulf of Nicoya in Costa Rica was pursued.
2. Preliminary analysis of growth, based on six months of length frequency data for one species common to the gill net fishery in the Gulf, was concluded and a report was submitted to AID.
3. Additional preliminary growth rate analyses of other species continued.
4. At the invitation of the Ministry of Agriculture and Livestock, Dr. Stevenson participated in an analysis of catch and effort data for the Pacific thread herring (genus *Ophistonema*) collected by staff biologists since 1968. Dr. Sutinen, one of the Principal Investigators of the Economic portion of this program, analyzed economic results. The Department of Marine Fisheries intends to issue a resource assessment report on the potential of Pacific thread herring but work has been postponed until such time as results are available from the current tag and recapture study.
5. Dr. Stevenson taught an evening fisheries course in Spanish at the University of Costa Rica.
6. The State-of-the-Art paper was completed and sent to AID.

Total Expenditures

Accumulative - \$42,206.84
Reporting Year - \$32,384.23

b. Lack of Innovation Among Small-Scale Fishermen

Project No. 2A - Sociocultural Correlates of
Developmental Change

Principal Investigator - Richard B. Pollnac

Narrative Description

Attempts to advance small-scale fisheries often fail due to the unwillingness of the solitary fisherman to change his fishing habits or the marketing of his catch. Research has indicated that fishing as an occupational subculture has several social and psychocultural features that separate it from other occupational subcultures, necessitating an approach to the question of development change which differs from that applied to small farmers.

A State-of-the-Art paper was prepared and submitted to AID which (1) reviewed literature concerned with the sociocultural concomitants of the transfer of technology; (2) developed a model profiling man's psychocultural adaptation to the marine environment; (3) examined psychocultural constraints placed upon the transfer of technology by specific features of the artisan fishing occupational subculture; and (4) indicated the types of data needed to understand the dynamics of psychocultural adaptation in a marine subculture undergoing socioeconomic and technological change.

Targets for Reporting Year

1. September 1-December 4, 1976 - Field Work in Costa Rica.
2. December 5-May 30, 1977 - Data analysis.
3. May 30, 1977 - Completion of final report on Costa Rica research.

Means of verification: submission of papers and the State-of-the-Art paper.

Accomplishments

Accumulative

The State-of-the-Art paper, as described above, has been completed, and submitted to AID. The findings will be applied to a problem in developmental change.

Aspects of the model presented as a part of the State-of-the-Art paper were tested in Costa Rica, where small-scale fisheries development projects are planned and in process. The field guide which forms part of the State-of-the-Art paper was used in this research. Problem focus was related to other University of Rhode Island projects being conducted in the same geographical region. The collected data provided important baseline information for assessment of the potential and real social impact of the project.

Reporting Year

Field research was carried out in Costa Rica during the period September-December; this involved the collection of data through survey research techniques and participant observation. More than 200 interviews were conducted in urban and rural areas in the Gulf of Nicoya.

Work was continued on data collected in Panama and a project planning trip was made to the Azores under the URI/AID contract.

The Principal Investigator co-sponsored a Symposium, "Maritime Adaptations," at the Annual Meeting of the Northeastern Anthropological Association in Providence, R. I.

Numerous papers were completed and submitted to AID (see Annex I, List of Publications).

Total Expenditures

Accumulative: \$24,396.99
Reporting Year: \$13,090.16

Project No. 2B - Lack of Knowledge About Effective
Message Design in Communication
for Technology Transfer

Principal Investigator - Irving A. Spaulding

Narrative Description

This project is supplementary and complementary to Project No. 2A. A system of record-keeping is to be introduced among artisan fishermen in Costa Rica. This will enable examination of the relationships between fishermen's identity-imagery (concepts) and their performance in innovative decision-making.

Data will be obtained when target groups of fishermen are given information about the record-keeping system and the opportunity to use it, as well as at the end of an interval during which trial of the system and its adoption or rejection can be expected to occur. The result should be a process for developing a message regarding an innovation to individuals in such a way that they will identify themselves, their work and needs with the message and decide to accept and use the innovation because it will be of benefit to them.

Targets for Reporting Year

1. Visit Costa Rica (Puntarenas) about mid-September 1977 to consult regarding data collection.
2. Prepare for data analysis and report writing.
3. Analyze data (to be provided by Dr. Pollnac during period September-December).
4. Write report.

Accomplishments

Accumulative

Targets of the work plan have been met since inception of the project.

Reporting Year

This work was undertaken to determine whether self-concepts of artisan fishermen have characteristics with potential for use in: (1) describing predisposition to change and adopt innovations; (2) predicting adoption of innovations; and (3) improving

communications to facilitate the adoption of innovations.

Characteristics of self-concepts were examined for artisan fishermen in two locations on the Gulf of Nicoya in western Costa Rica. Half of these fishermen were adopters of an experimental innovation -- a record-keeping system and book -- while half had not adopted it. Evidence indicates that adoption of the innovation is associated with a predominance of expectations in self-concepts; non-adoption is associated with a variety of self-concept structures. Imagery and evaluations were the other self-concept components considered.

Personal qualities associated predominantly with the adoption of this innovation were those of being orderly and keeping control of one's activities; associated predominantly with its non-adoption were relevant personal characteristics and a lack of necessary knowledge. Least frequently mentioned, for both adopters and non-adopters, were time orientations and related attitudes; these qualities varied, however, from concern for the future for adopters to lack of time for non-adopters.

The structural characteristics, i.e., imagery, expectations, and evaluations, and the qualities of self-concepts, suggest: (1) a paradigm for identifying fishermen with varying potential for adopting an innovation; (2) guidelines for the design of messages to potential adopters of an innovation. In this design use would be made of self-concept structures and qualities associated with adoption of the innovation. Each of these suggestions needs refinement and further examination.

The State-of-the-Art paper prepared for submission on July 1, 1976, was revised on May 1, 1977, and submitted to AID. A Final Report -- "Communication and Technology Transfer" -- was completed on June 15, 1977, and submitted to AID.

Total Expenditures

Accumulative - \$15,704.71
Reporting Year - \$9,066.45

c. Underutilization of Food Technology

Project No. 3 - Underutilization of Food Technology
Resulting in Losses of Available
Food

Part I - West Africa

Principal Investigators - Tung-Ching Lee
Clinton O. Chichester

Research Associate - Matthew Caurie (Ghana)

Narrative Description

This project was designed to improve the quality of and increase the amount of protein in fish and fish products with the goal of decreasing protein malnutrition in developing nations. Frequently fisheries programs have concentrated on increasing the fish catch but have not been concerned with other equally important aspects, such as marketing, processing, preservation or storage practices. The conversion of the raw fish to safe, nutritious products for human consumption has often been neglected. Technology can reduce losses in potential food products, broaden the distribution and use of foods and develop products which will better satisfy the food and nutritional requirements of individuals. This project illustrates how food technology can be the link between crude fish products and consumable food. Through improvements in the techniques of handling, processing, storing and marketing fish protein quality was retained and waste due to spoilage reduced. In the course of this study the researchers also planned to evaluate underutilized species with the goal of developing new, palatable fish food sources.

Targets for Reporting Year

1. July-December 1976 - On-site data collection (in field and laboratory).
2. October-December 1976 - Analysis of data.
3. January-April 1977 - Preparation of reports.
4. March-June 1977 - Laboratory investigations; completion of reports.

Means for verification in this and other projects include the periodic submission of reports and participation by ICMRD staff in resolving site problems en-

countered by researchers. In addition, information derived from the survey was disseminated to other groups in developing nations for use and corroboration of findings.

Accomplishments

Accumulative

1. An extensive literature review was conducted for reference background during the field work in Ghana.
2. All Phase I targets were met on schedule in the preparation of the Phase II on-site activities.
3. Certain misinterpretations on the nature of the project within the Ghanaian Government were resolved prior to on-site work.
4. A smoking process was developed which yields fish products of higher protein quality. The process differs from the traditional smoking process; the improvements initiated suggest it would be worthwhile to further study traditional preservation methods, such as salting and drying, in order to modify processing conditions and thereby improve the nutritional quality of the final fish products.
5. Technical information was published and made available for application in other countries.

Reporting Year

The survey made of the State-of-the-Art of fish processing technologies in Ghana resulted in findings which have relevance to other parts of West Africa. Generally, the handling of fish prior to marketing was found to be unsatisfactory. There is insufficient care of the catch in the boat and further damage is sustained and bacterial contamination increased when fish are landed on the beach. Ice is rarely used to preserve the catch and fishermen and fish peddlers allow excessive exposure to the sun.

It was found that four methods of fish preservation were generally used in Ghana: smoking, salting and drying, sun drying and frying. Smoking is the most

commonly used method. Frying, which heretofore had been considered a relatively insignificant method, was found to be more important than salting and drying in preservation. A detailed description of the various equipment and processes used for fish preservation, as well as recommendations for future laboratory studies, is contained in the State-of-the-Art paper dated August, 1977, which has been submitted to AID.

A survey of the patterns of production, utilization, and consumption of fish along the coast of Ghana illustrated the variations in quantity, composition of species and of cured products. The pattern of supply reflects seasonal occurrences of species, techniques for spotting fish schools used by the fishermen, and types of fishing activities pursued in local areas. It was also found that the utilization of certain species varied from region to region and that local taboos determined use patterns.

The above-mentioned report also contains information on other findings, including: a method for determining the freshness of fish based on the extraction of water soluble oxidizable substances; a description of a portable oven for smoking fish and a discussion of factors affecting smoke deposition of fish flesh which have been identified; an identification of the various processing factors on hot-smoke-cured butterfish; a method of determining equilibrium moisture in dehydrated food materials; and a description of a simplified technique for determining the packaging compatibility of various ingredients in dehydrated foods.

Part II - Central America

Principal Investigators - Clinton O. Chichester
Spiros Constantinides
Tung-Ching Lee

Narrative Description

The microbiological assessment of fish quality of the artisan catch around Puntarenas, Costa Rica, was made and there were indications that the fish became bacterially contaminated during holding, transport and marketing. Recommendations have been made to remedy this problem.

The microbiological quality of fish and fishery products for sale in Guatemala City, Guatemala, was investigated and it was found that in fresh-fish markets the tables, floor, ice and fish drip-pings were contaminated although the fish appeared good and the bacterial load was less than $10^6/\text{cm}^2$ after three days. A report on this survey - "Microbiological Quality of Fish for Sale in Guatemala City" - was prepared for ICAITI. Fish products subjected to filleting, freezing, drying and salting, had high bacterial counts which indicated mishandling. Recommendations were made to correct these problems. There is a need to conduct a State-of-the-Art survey in this area. A report entitled, "Assessment of Microbiological Quality of Fish in Central America (Guatemala and Costa Rica)" was completed in January 1978 and was sent to AID.

Total Expenditures for Entire Project
(West Africa and Central America)

Accumulative - \$50,167.86
Reporting Year - \$39,773.57

d. Knowledge Transfer Methodology

Project No. 4 - Knowledge Transfer Methodology
for Small-Scale Fisheries

Principal Investigator - John C. Sainsbury
Student Assistant - Mary Hall

Narrative Description

This project was originally scheduled to be conducted in Ghana. However, because the Government of Ghana refused to grant approval for field work the work plan was amended and emphasis instead was placed on the preparation of the State-of-the-Art study, involving literature searches and discussions with authorities in the field. In the course of this in-depth survey it was found that there was little material on the methodology of technology transfer. The linkage between the methodology of technology transfer within fisheries and for other small-scale enterprises, such as peasant agriculture and aquaculture, was explored. Components of a practical technology transfer project were identified and specific needs cited. A fisheries extension service was recommended as an effective

method of methodology transfer, possibly organized on regional lines and utilizing trained native experts rather than outsiders.

Targets for Reporting Year

The following activities were targeted and completed during the reporting period:

1. During a week spent at FAO headquarters in Rome an intensive literature search was conducted; personnel working on the FAO Small-Scale Fisheries Project and related programs were consulted.
2. The Principal Investigator spent two weeks in the Azores evaluating the possibility of transferring the project there.
3. A trip was made to Washington, D.C. to collect material; personnel working on related programs were consulted at Development Banks and government agencies.
4. An exhaustive list and analysis of programs involving technology transfer with small-scale fisheries was made.
5. An analysis was made of the possibility of linking methodology used in other small-scale enterprises with fisheries.
6. The State-of-the-Art paper was prepared.

Means of verification, as with the other projects, consists of progress reports and other submissions by the Principal Investigator.

Accomplishments

Accumulative

The dearth of relevant information in the field became evident in the course of the report year. Very little information exists on the methodology of technology transfer and success/failure factors for small-scale fisheries development programs. Personal interviews with authorities in the field corroborated the fact that little attempt has been made at such analysis.

A State-of-the-Art paper was prepared containing a summary of the specific findings. This survey indicates that methodology transfer between various types of small-scale enterprises may not be a productive avenue of study; and it concludes with the suggestion that transfer of technology in small-scale fisheries might best be accomplished on a regional basis with a strong emphasis on training of native teachers to improve local response to innovations.

To achieve a practical technology transfer project the Principal Investigator feels that the following components are necessary: (1) There must be an inventory and analysis of the socio-cultural, economic and technical environment within which the transfer and change is to occur; an assessment of the feasibility of technology for transfer; and procedures devised for effecting and maintaining the transfer. (2) Organizational arrangements are important in the design of a suitable Delivery System for effecting, supporting, monitoring, sustaining and multiplying the effects of the transfer. (3) Once conceived, the transfer should be effected, monitored and managed to a self-sustaining level.

Reporting Year

After discussion and searching of relevant literature a State-of-the-Art paper was completed in June 1977 and submitted to AID. The Survey of the current situation led the Principal Investigator to conclude that among the services and technologies most needed in LDCs were the following:

1. Development of a great number of technical papers, reports, instructional books, training manuals, data sheets, fact sheets, posters, and visual aids together with more efficient distribution systems.
2. Development of a simple and effective hauler for fishing gear with a simple drive system, utilizing easily accessible materials and requiring minimal expertise in use and repair.
3. A continuing research and development program aimed at small craft and gear for developing nations.

4. Establishment of regional centers for the development and dissemination of appropriate technology for small-scale fisheries.
5. Training program for native instructors.

Total Expenditures

Accumulative - \$23,707.90
Reporting Year - \$16,266.53

e. Economics

Project No. 5 - Economics of Small-Scale Fisheries
in Less-Developed Countries

Principal Investigators - Harlan C. Lampe
Jon G. Sutinen
Darrell L. Hueth

Research Associate - David Hughes (on loan from
Auburn University)

Research Assistants - Bruce C. Epler
Jan P. Johnson
Philip N. Logan
Rosemary Yates

Narrative Description

This project embodies several aspects of the economics of small-scale fisheries in LDCs. Investigations are being conducted in the areas of institutional constraints to artisan fisheries development; demand analysis for artisan fishery products; marketing system organization as an impediment to fisheries development; the cost and earnings of artisan fishermen; and the availability of fishermen's supplies in artisan fisheries.

Targets for Reporting Year

Economics

1. Application and testing of appropriate research techniques in selected LDCs (8/76-5/77).
2. Refinements of techniques, based on LDC experience (to be completed by 6/1/77).

3. Preparation of a report explaining and evaluating the research techniques, with suggestions for their application in other LDCs (by 8/30/77).

Institutional

1. Interviews of fishermen (by 10/1/76).
2. Analysis of the collected data (by 1/1/77).
3. Design of alternative organizational and legal frameworks (by 4/1/77).
4. Review of alternative frameworks with administrators, managers and fishermen (by 6/1/77).
5. Preparation of final report (by 8/30/77).

Means of verification include the submission of periodic reports to ICMRD and discussions among investigators and agencies taking part in the project.

Accomplishments

Accumulative

1. Economics of Small-Scale Fisheries - Investigations in the areas of demand analysis, marketing analysis, and costs and returns have proceeded as scheduled.
2. Institutional Constraints - Owing to a dearth of literature in the U. S. concerning the nature of legal and administrative frameworks for fisheries, much of the effort in this area has been postponed for in-country collection of data.
3. General - Contacts have been made with many fisheries organizations with regard to project planning. The literature survey has been completed, with evaluation of the literature and preparation of bibliographic lists in process. A rough draft of the State-of-the-Art paper has been completed. The application of research techniques in LDCs is well under way.

Reporting Year

1. A first draft of the State-of-the-Art paper, "Review of Economic Survey Methods for Artisan Fisheries," by Dr. Jon Sutinen, was completed and is being revised.
2. Michael Shenk and Dr. Sutinen have completed a first draft of a report on "An Application of Economic Survey Methods to the Fish Markets of San Salvador," based on work done during the grant year.
3. A system for gathering costs and returns information has been implemented and is now operational and self-sustaining within the Department of Marine Fisheries, Costa Rica.
4. A similar system (short-term) has been put into operation by the Fisheries Service of El Salvador.
5. With respect to demand assessment techniques, a household consumer survey was made in Guatemala City. The applied research techniques were refined and modified where needed in the implementation of systems, surveys, etc.
6. Prof. Lampe prepared two preliminary reports in January 1978 describing the research techniques employed and the refinements made ("A Brief Summary of the Guatemala Consumer Survey" and "A Brief Summary of a Retail Market Survey in the Area of San Jose, Costa Rica"). Additional reports are forthcoming.
7. In a retail market survey conducted in the area of San Jose, Costa Rica, it was found that the conditions in the retail sector are such that some concentration has arisen which appears to be attributable to existing economies of size. However, neither the margins nor profits appear to be excessive. In fact, judged by other systems, the margins are modest. Competition still appears keen. A fish price reporting system is in place for all market levels from the fisherman to consumer.
8. Cautions about future development and possibilities for market expansion are suggested by the

results obtained in the Guatemala City consumer survey:

- a. As per capita incomes increase, certain market sectors, particularly for cheap fish, may be injured, and the producers of these fish further disadvantaged. Provisions will be needed for providing marketing services.
 - b. Attention should be given to the development of products from some less desirable species and large fishes that are bone-free.
 - c. While results on distance-to-market as a factor appear to be mixed, the use of mobile vending stations would appear more promising than the building of separate fish stores unless these are near other markets.
 - d. There is need for better information on prices and availability of fish as well as information on its nutritional value (which is already recognized by a significant, though small, part of the respondents - 13%).
 - e. Since lower-priced fish are generally badly handled, some of the shift to higher-priced fish might be ameliorated by programs designed to improve handling and preservation of fish.
9. Theses pertaining to the project are under way and include:

"Demand for Fish in Guatemala City," by Rosemary Yates

"Fish Market Structure and Performance in San Jose, Costa Rica," by Bruce Epler

"Vertical Integration in Fish Distribution and Wholesaling," by Allen Scheid

"A Mathematical Programming Model of the Fisheries Sector in Costa Rica," by Philip Logan

Total Expenditures

Accumulative - \$183,519.88
Reporting Year - \$144,031.57

B. Objective/Output No. 2 - Response Capability

Narrative Description

This two-year grant extension was designed to focus the expertise of University staff on an integrated program in small-scale fisheries. The approach involved in-depth study of the literature resulting in State-of-the-Art studies of the various facets of the problem. The on-site projects were based on these studies and were designed to explore aspects which required further investigation. As a consequence of these projects University staff acquired additional knowledge and expertise which enhanced their ability to respond to requests from the field.

Targets for Reporting Year

These projects increased staff competence and enhanced the body of literature on the topic of small-scale fisheries. The distribution of the State-of-the-Art studies contributed to long-neglected informational needs in this important but generally ignored area of marine resources. Not only did the Center staff gain increased knowledge in these problems but nationals of the countries in which the projects were sited were also involved and acquired valuable expertise.

Accomplishments

Accumulative

Assistance in fisheries problems was concentrated particularly in those areas where projects were pursued. In addition, the Center responded to some outside requests.

Reporting Year

Project Activities

In Costa Rica, Dr. Stevenson and Dr. Sutinen held two workshops for staff members of the Marine Fisheries Department of the Ministry of Agriculture and Livestock. The first was held in the summer of 1976 and was a two-day orientation session on the techniques of data collection. In November 1976 a one-day meeting was held, attended by members of the Fisheries Department staff and by persons from various institutions and agencies in the country, in which preliminary results of the survey were presented and discussed. All URI staff members in Costa Rica at the time participated in these seminars, which were very successful in establishing rapport with in-country counterparts and created an atmosphere of cooperation.

In El Salvador and Guatemala the projects pursued were also in response to country needs and consequently government agencies and institutes in both of these nations cooperated fully in the projects.

Non-Project Activities

In January 1977, Dr. Sutinen and Dr. Stevenson were requested by the government of Costa Rica to do a survey of the herring industry. Dr. Sutinen's economic analysis involved consideration of the value of limited entry for the fishery and developing data on costs/returns and it demonstrated the need for management in the fishery. Dr. Stevenson worked on the biologic analysis of the fish population.

Egypt - Prof. Lampe was a member of an AID team evaluating the fisheries potential in Egypt. As a consequence of this team evaluation, Dr. Spiros Constantinides, of the Food and Nutritional Science Department, and Dr. Edmond Seay, of the Resource Economics Department, participated in a two-month-long evaluation of aquaculture in Egypt in the fall of 1977.

Sierra Leone - Lars Videus, candidate for a Ph.D. in the Resource Economics Department, participated in an AID project in Sierra Leone which involved the evaluation of inland and marine fisheries.

The Azores, Portugal - At the request of AID, selected members of the URI faculty completed a feasibility study for a program of assistance to the new University Institute of the Azores for the development of services in extension work in agriculture, livestock and fisheries. Following the completion of the survey the University received a three-year contract for technical assistance there.

Accomplishments, Report Year Summary

In-country work on this grant resulted in the establishment of an awareness by foreign government agencies of the needs in small-scale fisheries sectors. In addition to the responses detailed above, the interaction between URI faculty and their country counterparts resulted in several local requests for assistance. In all cases responses were prompt.

It is believed that the response capability of the University has been enhanced through the Grant extension and the experience gained in the implementation of the five projects.

Total Expenditures

It is impossible to quantify expenses in this objective.

C. Objective/Output No. 3 - Information Capacity

Narrative Description

When the original 211(d) grant was received in 1969 the problems relative to the accessibility of current documents in the marine resource field were well known. Consequently, the grant included funds for the establishment of a Library to serve the immediate informational needs of the faculty and staff working on ICMRD projects and also as a collection center for material. Most of the relevant publications in the field have a limited distribution and are issued by specialized country agencies, national and international organizations or are papers presented at symposia and conferences. The collecting of such literature was begun in 1969; in 1973 a professional librarian was hired to organize and acquire material on a more systematic basis.

The procurement of materials in this field is time-consuming and involves daily searching of current newsletters and periodicals as well as use of standard bibliographic tools. Frequently, documents can only be obtained through personal contacts in originating agencies. A great deal of the material is available only on an exchange basis; such arrangements facilitate collection development for all involved parties.

In addition to collection development, the Librarian has to organize the material so that it is accessible to users. Since the subject matter is topical and the format of the material is rarely in book form, special techniques have had to be devised within the limitations of space, time and money. Most of the items are more effectively stored in filing cabinets or filing boxes rather than shelved. Subject organization has been difficult because of the interdisciplinary nature of the program and because few guidelines with respect to classification and cataloging exist.

On the East Coast of the United States this is a unique Library; as the collection has grown, many requests outside of the immediate University community have been received, involving foreign as well as national interest.

Targets for Reporting Year

Final arrangements were made for the move of the Center Library collection to the new addition of the Main Library Building, thus insuring more access to the patrons on campus as well as enhancing the effectiveness of the Center Library

staff. With the resources of the Main Library immediately at hand the response capability of the Center Library will be considerably increased. The University has instructed the building contractors as to appropriate changes needed in the structure to accommodate the Center collection in separate, secure quarters.

The Librarian supervises the editing and printing of Center publications. During this report year the Proceedings of the Seminar-Workshop on Artisan Fisheries Development and Aquaculture in Central America and Panama was published; the Librarian devoted considerable time to this project which required extensive revision and Spanish-English translations. In addition to this publication and the State-of-the-Art studies, staff members have issued articles, chapters in compendia, and working papers which are also distributed through Library facilities. (For a complete listing of these publications see Annex I.)

Accomplishments

Accumulative

The Library has continued to grow and holdings now number about 3,500 documents, 100 books and an extensive collection of reprints, newsletters and serial publications from countries and international organizations, as well as relevant material prepared in the United States.

During the report year the Proceedings of the Seminar-Workshop in Central America and Panama was published and more than 600 copies were distributed. The following breakdown illustrates the diversity of interest in the work:

| | |
|---|-----|
| US/AID and other national/international agencies | 96 |
| US universities and libraries | 58 |
| US individual requests | 137 |
| Foreign institutions and individuals (including Africa 24; Asia 53; Australia, New Zealand and the Pacific Islands 7; Canada 12; Europe 77; Latin America 131; and the Middle East 7) | 311 |

Distribution was also made of the various Center publications of previous years as well as documents prepared during the current year, especially State-of-the-Art reports.

Requests for specific information on marine resource topics continue to be received, and in increasing numbers. In

spite of limited staff an attempt is made to handle such requests quickly and in depth, especially those received from LDCs. Among such inquiries might be mentioned a request for a bibliography on octopus for a scientist in Brazil, a literature search on jack mackerel and tuna resources in the eastern Pacific for a marine biologist at the University Institute of the Azores, material on mussel farming for an aquaculturist and papers on fish processing techniques for a technician in Chile.

Principal Investigators and graduate students rely on the Library for current documents and background literature related to ICMRD projects. Graduate and undergraduate students in the various marine-related fields at the University also use the material. Students and faculty from other universities and colleges and research centers in the United States have contacted the Librarian for help in obtaining elusive documents, including researchers from Woods Hole Oceanographic Institute, East Carolina University, the World Bank, Central Connecticut State College, the Institute for Marine and Coastal Studies at the University of Southern California, the Institute for Marine Studies at the University of Washington, Tufts University, the Cooperative League of the United States, the University of Puget Sound and Oregon State, to mention only a few.

Accomplishments

Reporting Year

The Librarian has been increasingly involved in publication duties during the report year. Usage -- both in-house and from outside sources -- continues to increase and absorbs more professional time. The Librarian has also devoted much time to drafting reports, including the major portion of this one. Collection development has been maintained but in order to accommodate the increasing demands of publication activities, report preparation and library usage, cataloging and classification duties have been neglected. It is hoped that increased funding in the future will provide the means for overcoming this backlog.

Total Expenditures

Accumulative - \$31,308.79
Reporting Year - \$19,247.47

D. Objective/Output No. 4 - Education and Training Capability

Narrative Description

Short training courses have been presented as an outgrowth of the work accomplished under this grant, particularly two sessions in Costa Rica sponsored by Dr. Stevenson and Dr. Sutinen. Dr. Stevenson conducted an evening fisheries course in Spanish at the University of Costa Rica.

Special programs of study have been organized on campus for foreign students under the sponsorship of FAO Fellowships or AID.

The marine programs at the University have expanded in scope, most notably the Ph.D. program in Resource Economics which is now being reactivated with a complete curriculum revision. Students will be accepted in the fall of 1978. In addition, the one-year Master of Marine Affairs Program has been expanded and in the fall of 1976 students were accepted into a regular two-year Master of Arts in Marine Affairs curriculum. The Animal Science Department now offers new courses in aquaculture and additional facilities have been constructed for experimental fish culture; similarly, courses, staff and equipment have all increased in the Fisheries and Marine Technology Program. The Graduate School of Oceanography has a new research vessel, the Endeavor, and a new building, combining staff and lecture space, is under construction on the Narragansett Bay Campus.

Targets for Reporting Year

The University will continue to make available staff and facilities for specialized programs of studies in marine fields. Foreign nationals will be accommodated in these specializations and the Office of International Student Affairs is available to assist students with any problems they may have.

Accomplishments

ICMRD assisted five special students during the report year who have pursued personalized courses of study for varying periods. ICMRD staff designed programs, assisted with housing and other arrangements, and provided all necessary contacts. The students are listed below:

1. FAO Fellowships:

Abdullah Salah Al-Haddah, Fisheries Division, Agricul-

ture Department, Kuwait.
January-August 1977
Program of Study: special training in fisheries and
marine technology

Luz Molina, Universidad Austral de Chile, Valdivia,
Chile
January 20-March 13, 1977
Program of Study: specially-designed program in food
science

2. AID Sponsorship:

Ponte Tavares - University Institute of the Azores
April and May 1977
Program of Study: food science (Ph.D. level)

Dr. Helen Martins - University Institute of the Azores
January 1977
Program of Study: fisheries biology and related aspects

Prof. F. Machado - University Institute of the Azores
March 1977
Program of Study: fisheries and marine technology

Nationals from developing countries enrolled in the Marine Affairs Program received scholarship aid from the Intergovernmental Oceanographic Commission; in fact, the University of Rhode Island is the only institution in the United States receiving funds from IOC for such training. While not under ICMRD the program is mentioned here as another indication of the University's commitment in the international field. During the Grant year the following students received such IOC aid: Virginia Aprieto, of the Philippines, and Simon-Tache, of Cameroon.

Another student in the Marine Affairs Program, Ethnan Golley-Morgan, of Sierra Leone, was sponsored by the Afro-American Foundation, and two others were funded by their governments: Vincent Adebolu, of Nigeria, and Renzo Fallegoti of Chile.

Central America

Under the auspices of the sub-projects in the Economics section (Project No. 5), training was received by country nationals: Costa Rica--8 technicians, 3 professionals; El Salvador--4 technicians, 2 professionals; Guatemala--1 professor and 12 undergraduates from the University of San Carlos. Under the Stock Assessment Project (No. 1), 4 technicians

and 2 biologists were trained in Costa Rica.

Total Expenditures

Expenses cannot be quantified in this area.

V. IMPACT OF GRANT-SUPPORTED ACTIVITIES IN ACHIEVING GRANT PURPOSES

As a result of the work done during the two years of the grant extension based on the experiences gained during the prior grant period, the University has developed a record of substantially what literature is available regarding small-scale fisheries in developing countries (very little), and enumerated what material is needed on this subject (very much); developed and measured the weaknesses and the strengths in the "systems" approach; introduced several innovations on a trial basis for use in small-scale fisheries; and, generally, laid the groundwork for a final effort to produce a total small-scale fisheries program. In the meantime, the University continued to respond to AID requests for special assistance. Also, the University strengthened its linkages, including the signing of a formal agreement between the Costa Rican Ministry of Agriculture and Livestock and ICMRD confirming the continuation of the excellent cooperation between the two organizations and the generous contribution of manpower and facilities made to the project without charge by the Ministry.

Valuable training and experience have been acquired as a consequence of this grant not only by the senior staff but also by the graduate students involved, four of whom are writing theses on topics related to this experience, and the in-country staff members who participated in the projects. Faculty and staff members have made their expertise available by describing the results of their research in papers in professional meetings, articles in journals, chapters in books, or grant-sponsored publications, as well as participating in symposia sponsored by grant activities, AID, professional organizations, or international meetings.

Contacts made during the projects have served to attract foreign nationals to University programs, and the professional expertise acquired by faculty and staff members has resulted in the expansion and development of programs in the marine fields. The foreign students attracted to the University not only acquire knowledge and techniques, they also contribute to the knowledge base through their participation in the various programs.

During the year the holdings of the Center Library have grown

and progress was made in organizing the material to make it more accessible to researchers. The growing reputation of the Center has increased the usage of the Library and numerous requests for information both from developing nations and U. S. centers have been handled by the Library staff.

VI. OTHER RESOURCES FOR GRANT-RELATED ACTIVITIES

A. CODOT Activities

The Consortium for the Development of Technology (CODOT) has been particularly active in food technology and related activities during this grant year. CODOT represents five universities -- URI, the University of Washington, the University of California at Davis, the University of Wisconsin, and Michigan State University -- with the Executive Office at the University of Rhode Island. Dr. Chichester, of the Food Science and Technology Department, is Chairman of the Executive Coordinating Committee and the Assistant Director of ICMRD also serves as Executive Assistant for CODOT. The University benefits substantially from having CODOT on campus.

The following is a brief description of CODOT activities during this grant period:

A two-year contract for \$1,142,191 was signed by CODOT and the State of Sao Paulo in Brazil in August 1976 to provide continuing assistance to the Instituto de Tecnologia Alimentos (ITAL). This represented an extension of a previous two-year contract. CODOT will assist ITAL in five major food technology programs designed to improve food production and its quality in Brazil. Among the CODOT staff members involved there are two URI faculty (one from the Department of Resource Economics and the other from the Department of Food Science and Technology).

A request was received from Iran for a proposal involving CODOT in the improvement of the Iranian Institute of Nutritional Sciences and Food Technology. Following a visit of three members of the Executive Committee, a formal proposal was submitted in late 1977 for a three-year program which eventually resulted in a \$1,527,000 contract.

CODOT was asked by the U. S. Treasury in July 1977 to submit a proposal for the establishment of a Food and

Drug Quality Control Directorate in Riyadh, Saudi Arabia. The Central American Research Institute for Industry (ICAITI), in Guatemala City, Guatemala, requested CODOT's services, and a Basic Ordering Agreement in the amount of \$10,350 was signed which provides for research to be done in the United States for ICAITI under CODOT auspices. Consultants are to be sent to ICAITI for both short- and long-term assignments, and students from Central America may be trained in the United States.

These additional resources provide manpower, equipment, and staff in ICMRD which directly benefit its Grant activities through shared use.

B. General University Activities

Since the University of Rhode Island is one of the major Sea Grant Universities it receives substantial funding from that source every year. This financing enables the University to pursue basic surveys in marine areas, specifically fish resource evaluations, economic studies, and work on fishing gear and technology, all of which are relevant to Center activities. Sea Grant funding has contributed substantially to the activities of the Marine Advisory Service at URI and some of the expertise acquired in the extension work of that group will be important to the development of regional training centers in fisheries methodology, as suggested by Dr. Sainsbury in his State-of-the-Art paper prepared for Project No. 4.

Basically, all the marine programs at URI might be cited as contributing to the effectiveness of grant-related activity because of the inter-disciplinary nature of the field.

VII. UTILIZATION OF INSTITUTIONAL RESPONSE CAPABILITIES IN DEVELOPMENT PROGRAMS.

A. Requests for Assistance

Requests received by ICMRD for assistance in LDC development programs during the reporting year have been discussed in detail in Section B. Objective/Output No. 2 - Response Capability.

These requests came from AID, the Food and Agriculture Organization of the UN (for its Fellowship program) and, as discussed in VI above, CODOT has received requests from the U. S. Treasury, from an agency of the Government of Iran,

and ICAITI, headquartered in Guatemala and representing the interests of the Central American States.

In responding to these requests (as well as an unknown number addressed to individual faculty members which are at least indirectly related to development programs), the University has demonstrated that it has a broad range of response capability which is well utilized. This response is further evidence of the University's continuing and increasing commitment to international programs, as well as its growing reputation as a source of assistance to LDCs.

B. Other

1. Number of LDC Graduate Students and Countries of Origin

During the reporting year there were more than 100 LDC graduate students enrolled at URI. Another 100 students from LDCs were enrolled in undergraduate curricula at the University or were pursuing special programs tailored to specific requirements. These students came from the following countries: Brazil, Chile, Cyprus, Ecuador, Ghana, Guyana, Hong Kong, India, Indonesia, Iran, Kenya, Korea, Lebanon, Malaysia, Nigeria, Philippines, the Republic of China, Saudi Arabia, Sierra Leone, Spain, Sudan, Thailand, Turkey, and Yugoslavia.

2. Number of Visitors

ICMRD hosted the visits of 15 foreign nationals during the report year. Among these visitors were heads of government agencies, visiting scientists, university administrators, and specialists from international agencies. Numerous U. S. visitors also came, including professors, representatives from government offices, a Peace Corps volunteer seeking information for his assignment abroad in Sabah, and staff members of private research organizations. There were undoubtedly many more visitors to the campus seeking information on topics related to the marine fields at URI. Unfortunately, there is no central visitor's registry at the University and no specific information on such visits can be provided.

3. Known Use of Research, Teaching Materials, Methodologies

The State-of-the-Art studies produced under this grant are important contributions to the field; they have been made available in mimeograph form and the demand for them has been considerable. It is planned to publish them,

after revision, in more permanent form. In addition to these surveys the researchers have written extensively on their findings and this material has appeared or will appear in journals and other publications in the related fields.

As has been mentioned previously, the field work in the economics project represents thesis topics for four of the participating graduate students.

In Costa Rica two seminars were held to explain the techniques being used in economic and biological surveys.

As a result of research undertaken by Dr. Pollnac in Costa Rica under this grant and earlier work conducted in Panama and Puerto Rico, he and Dr. Poggie (both of the Anthropology Department) and Dr. J. Acheson, of the University of Maine, have received a National Science Foundation grant through RANN (Research Applied to National Needs) in the amount of \$270,000. The grant title is "The Study of Sociocultural Aspects of Fisheries Management in the Northeast Under Extended Jurisdiction."

At the request of the Department of Marine Fisheries, Costa Rica, Dr. Stevenson and Dr. Sutinen participated in a survey of the Pacific thread herring (*Ophistonema*). Dr. Stevenson's work involved the analysis of catch and effort data in collaboration with Sr. Francisco Carranza, a biologist with the Department of Marine Fisheries. The aim of the collaboration was to assist the Department in determining the potential of the resource and in applying appropriate management regulations.

Dr. Stevenson also prepared a report in collaboration with Dr. Fernando Viquez, of the Department of Marine Fisheries, Costa Rica, with respect to preliminary efforts to determine growth rates for the principal species sampled in the Gulf of Nicoya by URI and Department personnel during July 1977-June 1977. This report emphasizes general aspects of the length frequency data (e.g., size ranges, number of modes, modal lengths), analyzes the availability of different species according to gear type and fishing zone and draws some tentative conclusions concerning growth rates. This report was issued by the Ministry in March 1978.

Using materials produced during his work on the 211(d) stock assessment project, as well as his experience in Puerto Rico under 211(d) auspices, Dr. Stevenson taught an evening course on fisheries, in Spanish, at the University of Costa Rica. Work done by Dr. Sainsbury on

the methodologies of fisheries technology transfer was utilized by him in the design of a proposal for the University Institute of the Azores. This proposal resulted in a major AID contract being awarded to the University of Rhode Island.

Methodologies devised in the economics project are being used in Costa Rica for the early stages of implementation of a fisheries development plan. The economic survey methods have been adopted by all personnel in the Fisheries Departments of Guatemala, Costa Rica and El Salvador for the collection of economic and technical data. Similar techniques have been adopted for the Azores project.

In Ghana, Dr. Matthew Caurie, who received his Ph.D. at the University of Rhode Island in Food Science and was the Research Associate on Project No. 3, has continued his research on the preservation and improvement of the nutritional value of fish products at the Food Research Institute there.

The research, project activities and student training undertaken by food scientists at URI enhanced their contributions to CODOT efforts. Undoubtedly, the existence of these experienced staff members influenced the decision of the U.S. Treasury when it sought assistance for Saudi Arabia. The request from the Director of the Iranian Food Sciences Institute probably also reflects an appreciation of URI input into CODOT activities.

The examples given above of utilization of institutional strengths are not comprehensive. The value of the research, methodology and teaching methods evolved through activities under this grant cannot be quantified and will probably be most significant in the future.

4. Significant Roles in Development Played by Graduates of the University

The role of Dr. Matthew Caurie, in Ghana, has already been cited. Among the other recent graduates might be mentioned Luis Adriasola, who received his Ph.D. in Marine Resource Economics and has returned to Chile, where he is currently on the faculty of the Universidad Catolica de Valparaiso, Chile. Lars Vidaeus, just completing his doctoral studies in Marine Resource Economics, participated in an AID fisheries project in Sierra Leone. Working on Master's Degrees in Marine Resource Economics were four Indonesian nationals who have returned to their country and resumed their work in the

Fisheries Department there. They added knowledge and contacts for the Resource Economics Department which were to prove valuable when URI was awarded a contract to evaluate a fisheries project in Indonesia.

There have been a number of graduates from developing countries in the Marine Affairs Program. Dr. Aldo Brussoni, Uruguay, has returned to the National Commission on Oceanography and is preparing a Master Plan for Development of Marine Resources in Uruguay. Dr. Victor Gallardo has returned to his position at the University of Concepcion, Chile. Srta. Stella Vallejos, of Argentina, is a member of the staff of the Economic and Social Council, United Nations. Mr. Elias Ayisi, Ghana, is a member of the Nautical College, Accra. Mr. Abraham Alameyu, of Ethiopia, is his country's representative at the Law of the Sea Conference.

The Fisheries and Marine Technology Program has attracted many students from developing nations. Mr. Robert Stone, Fiji, is Head of the Fisheries Department of his country. Sr. Miguel Fierro is on the staff of the Escuela Superior Polytechnica del Littoral, Guayaquil, Ecuador.

In other marine specializations mention might be made of the following graduates: Dr. J. Amaya, Colombia, on the staff of the Food and Resource Chemistry Department at Campinas, Brazil; Dr. Mahn Bhovichitra, who received his Ph.D. in Oceanography, a faculty member at the College of Fisheries, Kasetsart University, Bangkok, Thailand; and Dr. Gholam H. Kazemian, who is now the Minister for Cultural Affairs of the Imperial Iranian Embassy, Washington, D. C. He is in frequent contact with URI regarding the admission of Iranian students.

This list is not meant to be comprehensive; it is illustrative of the diversity of programs available to nationals from developing countries at URI. It should also be noted here that many of the students from developing countries take courses in other marine fields besides that of their major interest. Indeed many graduate with two degrees.

5. Personnel Involved in Non-211(d) Grant Development Programs

In addition to the personnel involved directly in the 211(d) grant projects, the faculty and staff of the University are involved in a wide variety of development

activities and research. Although many of these programs are primarily of benefit to the United States, they do generate expertise and knowledge of value to LDCs. A few representative examples of grants received by University personnel follow:

Clinton O. Chichester
SUDEPE, Brazil
"Food Technology, Phase 2"
\$1,142,191

John Sieburth
National Science Foundation
"In Situ Microbiology of Organismatter Cycling
in the Sea"
\$250,000

Thomas Meade
Department of the Interior
"Investigation of Parameters of Nitratotoxicity
Employing Water Reuse"
\$36,000

Theodore Smayda
National Science Foundation
"In Situ Phytoplankton Growth and Physiological
Studies on Campeche Bank"
\$25,400

Geoffrey Motte
State of Rhode Island
"Fisheries Students' Statistics"
\$9,227

Michael Bender
Environmental Protection Agency
"Influence of Dredge Spoils, Sewage and
Sludge Pollutant Organisms"
\$68,218

John Gates
National Marine Fisheries Service
"Impact of Regulations Proposed for Fishing
Industry"
\$17,820

G. Ross Heath
National Science Foundation
"Studies of Deepsea Ferromanganese Fixed
Transition Materials"
\$58,400

Robert McMaster
Yankee Atomic Energy Commission
"Beach and Nearshore Survey of Charleston, RI"
\$8,050

Robert Taber and A. Allen
National Marine Fisheries Service
"Scottish Seining Technology - Transfer
Demonstration"
\$5,000

Saul Saila
Department of the Army
"Benthos Survey in Eastern Long Island
Sound"
\$2,100

John Sainsbury and Donald McCreight
Agency for International Development
"Provide Technological Assistance to Uniy-
ersity Institute of the Azores"
\$40,009

John Sainsbury
National Oceanic and Atmospheric Administration
"Commercial Fisheries Training Program for
NOAA Commissioned Corps"
\$3,402

Aaron Alton
State of Rhode Island
"Marketing Effort for Ocean Pout"
\$35,000

Saul Saila
National Marine Fisheries Service
"Aging Atlantic Bluefish Tuna. Critical Surface
Growth Analysis"
\$4,970

D. Randolph Watts
National Science Foundation
"Joint U.S./U.S.S.R. Mid-Ocean Dynamics Experi-
ment Polymode"
\$19,900

William Bivona
National Oceanic and Atmospheric Admin-
-istration
"New England Marine Advisory Service
Regional Information Center"
\$5,000

Robert Sexton
National Oceanic and Atmospheric Administration
"ARGO Merchant Oil Spill Survey Cruise"
\$85,051

Clinton O. Chichester and Tung-Ching Lee
National Science Foundation
"The Nutritional Effects of Maillard Browning
of Foods"
\$64,000

Saul Saila and Bruce Rogers
New England Power Company
"Study of the Mortality and Growth Rates in
the Early Life Stage of the Winter Flounder"
\$23,123

Kenneth Simpson
National Marine Fisheries Service
"Evaluation of Clam Waste in a Moist Fish Feed"
\$33,937

E. Durbin and A. Durbin
National Science Foundation
"Interaction Between Atlantic Menhaden
Phytoplankton and Zooplankton"
\$138,100

Howard Winn
Marine Mammal Commission
"Assessment of the Population of Humpback
Whales"
\$21,139

Michael Pilson and Nelson Marshall
National Science Foundation
"Physiological and Ecological Studies of
Temperate Coral"
\$28,400

Kenneth Simpson
Environmental Protection Agency
"Marine Larval Juvenile Fish"
\$25,000

Kenneth Simpson
National Science Foundation
"Research Grant on Carotenoids"
\$23,200

C. Linkages

The University of Rhode Island has continued to strengthen the linkages established during prior years of grant funding both nationally and internationally and additional linkages have been formed. Nationally, close relationships exist with the following institutions:

Auburn University
University of California, Davis
Michigan State University
University of Vermont
University of Washington
University of Wisconsin
Board for International Food and Agricultural Development
East-West Center
National Science Foundation
National Marine Fisheries Service, NOAA
Peace Corps
Department of State

The following list is representative of international contacts:

Azores - Instituto Universitario dos Azores

Chile - Universidad de Chile, CEPLA (Centro de Planeamiento)
Instituto de Internacional Estudios de la Universidad de Chile
Universidad Catolica de Valparaiso
Universidad Austral de Chile, Valdivia, Chile

Costa Rica - Food Research Institute (CITA)
Department of Marine Fisheries, Ministry of Agriculture and Livestock
Vice Minister for Agricultural Resources,
Ministry of Agriculture and Livestock
University of Costa Rica

Ecuador - Escuela Superior Politecnica del Guayaquil

El Salvador - General Directorate, National Public Resources, Ministry of Agriculture

Fiji - Fisheries Department

Ghana - Food Research Institute
University of Cape Coast

Guatemala - Artisanal and Marine Fisheries Project, Ministry of Agriculture
Guatemala University
ICAITI (Instituto Centroamericano de Investigacion y Tecnología Industrial)

Honduras - Fisheries Department

Malaysia - Faculty of Veterinary Medicine and Animal Science, Universiti Pertanian Malaysia
Division of Fisheries and Marine Science

Indonesia - Department of Fisheries

Food and Agriculture Organization of the United Nations

United Nations Development Programme

CIDA - Canadian International Development Authority

IDRC - International Development Research Centre, Canada

SIDA - Swedish International Development Authority

DANIDA - Danish International Development Agency

ICLARM - International Center for Living Aquatic Resources

World Bank

There are, of course, additional linkages that might be cited.

D. Plans for Utilization of Institutional Response

The University of Rhode Island is planning to participate in the implementation of Title XII, "Famine Prevention and Freedom from Hunger," of the International Development and Food Assistance Act of 1975. The Director of ICMRD, Dr. Gerald A. Donovan, is the Chairman of a Fisheries Task Force of the Organization of Presidents of Land Grant Colleges in New England, which is drafting a comprehensive proposal for a small-scale fisheries program overseas. Representatives of the Resource Development Associates (RDA), of Los Altos, California, visited and consulted with ICMRD and URI faculty regarding the University's 211(d) Grant experience and the planned participation in Title XII by the New England Land Grant Colleges under URI leadership.

URI is also planning to submit an institutional strengthening proposal (for overseas assistance in fisheries and food technology) for which BIFAD expects to make funds available in the not-too-distant future. URI will endeavor to participate in a food science and nutrition project which is expected to be established under Title XII.

As stated earlier, URI/CODOT was approached by the U.S. Treasury as to whether it would be willing to participate in a long-range program of assistance to the Kingdom of Saudi Arabia in the establishment of a Quality Control Directorate in the Ministry of Commerce. Treasury is the U.S. representative on a joint Saudi Arabian-U.S. Economic Development Commission. The program involved sending food scientists to Saudi Arabia to staff the laboratories where imported food would be tested, and training some 60 or more Saudi Arabian students to the M.S. and Ph.D. levels to eventually replace the American scientists. URI/CODOT responded affirmatively and developed plans for the use of its own manpower and sought to ascertain the availability of manpower in the other CODOT member universities. (Eventually URI/CODOT was awarded a \$98,075 contract for the training of the students.)

URI/CODOT was also approached by the Director of the Institute of Nutrition Services and Food Science of Iran to assist that institution by sending food scientists to Iran and training Iranian students. Three CODOT food scientists from URI, the University of Wisconsin and the University of Washington visited the INFST and developed plans for the requested assistance. A proposal was submitted late in 1977 and in the following year a three-year, \$1,500,000 contract was signed.

From the foregoing it will be seen that the University does plan to use its institutional response capability and is using that capability effectively.

VIII. NEXT YEAR'S PLAN OF WORK AND ANTICIPATED EXPENDITURES

As an outgrowth of the work accomplished under this two-year extension (and including \$50,000 in additional funding granted by AID as a consequence of its mid-year review), a new proposal was submitted to AID. This proposal involved a continuance and extension of much of the work pursued between 1975-1977. It was decided to eliminate one project - the methodology of fisheries technology transfer - in large part because of the involvement of the Principal Investigator in the AID-funded project at the Instituto Universitario dos Azores, Portugal. The work in the food technology area was transferred to Central America where the numerous linkages previously established

there by University staff would facilitate research activities planned. Specifically, the program planned for 1977-78 includes the following:

A. Organizations and Structures in Fisheries Development

Project: Decision-Making Infrastructures for Artisan Fisheries Development

Since changes in artisan fishing in Central America are tied to the administrative infrastructure, an in-depth analysis of administrative agencies - national, regional and international is planned.

Phase One - The identification of the key institutions and decision-makers relating to fisheries development in three Central American countries:

In Costa Rica - The Ministry of Work and Social Security, the Ministry of Agriculture and Livestock, the Artisanal Fisheries Cooperative (CCOPERES), the Institute for the Development of Cooperatives (INFO COOP), the National Council of Production.

In Guatemala - The Department of Artisanal Fisheries, the Department of Renewable Resources, Division of Wildlife, the National Bank of Agricultural Development, Department of Agriculture--Division of Farming Cooperatives.

In El Salvador - The Ministry of Economics--Development Program for Artisan Fisheries, Salvadoran Institute of Cooperative Improvement (INSAFO COOP), the Bank of Farming and Livestock Development, Salvadoran Institute of Industrial Development (INSAFI), the Basic Project for Fisheries Development in El Salvador, National Council of Planning and Economic Coordination (CONAPLAN).

Phase Two - At this stage it is planned to:

1. Construct the research design;
2. Gather organizational and interview data from selected decision-makers and institutions.

Phase Three - It is hoped to construct a model or prototype of institutional alternatives which will maximize artisan fisheries production and returns in the most effective and efficient manner.

Expected Cost: \$29,110.

B. Economic Framework

This project is designed to provide a framework for the economic evaluation of policy options in fisheries development which will require: (1) further development of a preliminary model; (2) the testing of the preliminary model in Costa Rica; (3) the modification and refinement and/or redefinition of the model, if necessary; and (4) further testing in both Costa Rica and Guatemala. Careful consideration is to be given the trade-offs involved in improved decision-making efficiency and the costs of providing data as well as the costs of developing and operating the model framework. Work will take place in Costa Rica and Guatemala.

Expected outputs include: (1) creation of economic models for two decision-making levels, one at the policy level and one at the management level; (2) systems developed in place in Costa Rica and Guatemala; (3) enhancement of skills of URI professionals with respect to solving development problems at the policy and management levels in LDCs; and (4) the consequent enhancement of response capability at the University.

Expected Cost: \$133,417.

C. Economic Information Systems

The objective is the development of low-cost systems of data collection and analysis that link directly to the decision processes in policy formulation and development program management. This requires: (1) refinement of sampling systems for data collection, based on past experience; (2) the testing of new data collection systems in Costa Rica and El Salvador; (3) the design of preliminary data systems for Guatemala based on prior experience; (4) the testing of these systems in Guatemala; and (5) the refinement and adjustment of systems to meet the particular needs of the economic framework activities. After field work on these problems, data analysis and development of efficient systems for managing data will be done at the University because of the extensive computer involvement required;

systems will be adapted to computer facilities available in developing countries.

Outputs expected from the project are: (1) design of data collection systems with appropriate sampling schemes that can be effectively used in LDCs to provide information for policy formulation, management and project design; (2) creation of data management and analytic systems consistent with limited computer facilities in LDCs; (3) leaving systems in place in participating countries along with manpower trained in their use; (4) expanding University response capabilities in advising on information system development. This activity will provide methods of obtaining cheaper and more precise data in developing countries.

Expected Cost: \$124,134.

D. Sociocultural Constraints on Development

Sociocultural variables play a key role in development projects; consequently, integrated projects of fisheries development must take into consideration the sociocultural factors which mediate between humans, their technologies and the environment. Failure to account for these variables will result in an incomplete analysis and potential project failure. This project will extend the knowledge base concerning sociocultural factors associated with change among small-scale fishermen.

The objectives of this proposal are: (1) to conduct a brief follow-up study of sociocultural factors associated with fishermen's cooperatives and their relative success or failure; (2) to examine past and ongoing innovative behavior and its relationship to community social structure and individual success in regions where other subprojects are contemplated or ongoing; (3) to provide baseline data concerning sociocultural variables linked to other major areas of the project; (4) to determine existing formal and informal communication networks with regard to various aspects of artisan fishing in project areas; and (5) to assess social-psychological variables associated with innovative behavior and the communication of innovations.

Methods employed will involve field studies, including interviews, survey research with questionnaires, and participant observation. Statistical analysis and report preparation will be conducted at the University.

The research will provide: (1) contextual information which will facilitate interpretation of data from other subprojects; (2) data concerning the existing social and cultural

resources; (3) a test of the usefulness of the models generated in "Continuity and Change in Marine Fishing Communities," the State-of-the-Art paper prepared for USAID; (4) a follow-up report dealing with sociocultural research on fishermen's cooperatives in Panama; (5) inputs to planning and decision-making processes concerning proposed changes in the artisan fishery; and (6) research reports for agencies and publications in professional journals which will increase the knowledge base and further the State-of-the-Art concerning small-scale fisheries. The research is designed to increase its usefulness to both the target populations and other sub-projects.

Expected Costs: \$55,943.

E. Distribution and Utilization of Technology

This project was designed to continue work accomplished in Central America and Ghana. Two agencies in Central America, CITA (the Food Research Institute) in Costa Rica and ICAITI (Instituto Centroamericano de Investigacion y Tecnologia Industrial) in Guatemala have indicated their willingness to participate in projects related to the handling and utilization of fish products. Specific objectives include: (1) the study of the technological characteristics of fish; (2) ways of improving handling and sanitary conditions; (3) the improvement and application of appropriate processing techniques; (4) the development of new products utilizing available technology; (5) preparation of pamphlets relating to fish handling and preservation, assessment, processing, product development, and preparation; and (6) assist in the development of food technology related to fish utilization in the region.

The chemical composition of certain predominant fish species will be determined in order to select the most efficient method of utilization. Since initial handling procedures determine the condition of the final product it is of utmost importance to apply proper handling and sanitary practices. Simple and economic chemical and microbiological methods will be developed to assess fish quality and these methods will be tested on the various fish species. Currently extant processing methods will be assessed and the suitability of each species for certain types of processing will be evaluated. Processes involved will be: smoking, sun drying and freezing. Minced fish flesh technology will also be investigated for product development.

The food institutes in Central America are interested in developing new food technology for fish. These institutes are excellent regional training centers. This work would improve the information base for University faculty and staff and increase response capability in food technology. Publications relating to findings will be prepared for local use and professional journals.

Expected Cost: \$72,016.

F. Resource Management

This project is designed to provide information for the preparation of a manual on the techniques of setting up, operating and analyzing a tag and recapture program for stock assessment and resource management. The project will be pursued in Costa Rica with an assistant supplied by the Department of Marine Fisheries of the Ministry of Agriculture and Livestock.

In the first phase a tag and recapture program will be started in Costa Rica. Computer analysis of the length-weight and fishing effort data will be pursued in the second phase. In the third phase there will be a comparison of the results of the length-weight and fishing effort analysis and the initial tag and recapture analysis. Following the analysis of the two different estimation systems work on the manual will begin. The following four documents will be produced: (1) a length-weight and fishing effort analysis; (2) a tag and recapture analysis; (3) comparison between the two methods; and (4) a tag and recapture manual.

Expected Cost: \$60,861.

IX. INVOLVEMENT OF MINORITY PERSONNEL AND WOMEN

The University of Rhode Island is an Affirmative Action employer and is committed to the maximum effort in the hiring of minorities and women. As a consequence of this policy there are a significant number of minorities and women at the University at all levels -- students, faculty and staff.

This commitment extends to overseas employment as well as campus employment. During the grant year one of the women serving as a Student Assistant on the Economic Project worked in Guatemala (without her URI colleagues) and supervised an all-male team of Guatemalans.

Other positions held by minorities and women under the 211(d) grant or grant-related activities include:

1. Principal Investigator, Project No. 3 - Oriental
2. ICMRD Librarian - Woman
3. Administrative Assistant - Woman, American Indian
4. Research Assistant, Project No. 5 - Woman
5. Student Assistant, Project No. 4 - Woman
6. Administrative Secretary, ICMRD - Woman
7. Fiscal Clerk - Woman
8. Clerk Typist (one-half time ICMRD) - Woman, American Indian

The International Center will continue its efforts to attract minority personnel. Its efforts are facilitated by the opportunities afforded by the nature of its work and its funding, including the 211(d) grant. The grant provides employment opportunities for minority personnel and women both in the U. S. and abroad; the nature of the program attracts people who wish to participate in efforts to improve economic and social conditions among the LDCs.

Table I

Distribution of 211(d) Grant Funds and Contributions From Other Sources of Funding*

Reporting Period July 1, 1976 - August 31, 1977

| Grant Objectives/Outputs | 211(d) Expenditures | | | | Non-211(d) Funding Amount* |
|---|-----------------------------------|---------------------|------------------------|------------------------------|--|
| | Review Period 7/1/76 - 8/31/77 | Cumulative Total | Projected Next Year | Projected to end of Grant | |
| Objective/Output #1: Extended Knowledge Base Project #1 | \$ 32,384.23 | \$ 42,206.84 | \$ 30,905 | \$ 35,956 | \$125,000 - estimate of the contributions in personal services, space, equipment and transportation made available by the Governments of Costa Rica, El Salvador and Guatemala for these projects. |
| 2A | 13,090.16 | 24,396.99 | 21,885 | 34,056 | |
| 2B | 9,066.45 | 15,704.71 | - | - | |
| 3 | 39,773.57 | 50,167.86 | 30,448 | 41,568 | |
| 4 | 16,266.53 | 23,707.90 | - | - | |
| 5 | 144,031.57 | 183,519.88 | 134,655 | 113,200 | |
| 6 | - | - | 17,203 | 13,712 | |
| Subtotals | 254,612.51 | 339,704.18 | 235,096 | 238,492 | |
| Objective/Output #2: Response Capability | - | - | | | |
| Objective/Output #3: Information Capacity | 19,247.47 | 31,308.79 | 35,758 | 36,605 | |
| Objective/Output #4: Education & Training Capab. | - | - | | | Training programs for personnel from Chile, Kuwait and Ecuador: \$10,729.38 |
| Director's Office | 54,472.70 | 84,723.32 | 38,669 | 47,532 | \$81,000 in Salaries & O/H |
| Totals | \$328,332.68 | \$455,736.29 | \$309,523 | \$322,629 | * Total \$216,729 |

Table II - A

211(d) Expenditure Report

Actual and Projected Summary

Under Institutional Grant #AID/csd 2455

Reporting Period July 1, 1976 to August 31, 1977

| | Expenditures to Date | | Projected Expenditures* | | | Total |
|--------------------|----------------------|-----------------------|-------------------------|------------------|---|------------------------|
| | Reporting Period | Cumulative Total | Y E A R | | | |
| | | | 1 | 2 | 3 | |
| Personnel | \$175,140.14 | \$858,852.75 | \$167,788 | \$183,978 | | \$1,210,618.75 |
| Graduate Students | 44,220.97 | 202,447.29 | 45,570 | 43,906 | | 291,923.29 |
| Travel | 11,352.84 | 115,286.20 | 45,276 | 39,627 | | 200,189.20 |
| Other | 97,618.73 | 196,357.78 | 50,889 | 55,118 | | 302,364.78 |
| Grand Total | \$328,332.68 | \$1,372,944.02 | \$309,523 | \$322,629 | | \$2,005,096.02* |

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* Total reflects 1977-1979 grant from AID of \$635,000.

Table II - B

211(d) Expenditure Report

Reporting Year Detail

Under Institutional Grant #AID/csd 2455

Reporting Period July 1, 1976 to August 31, 1977

I. A. Salaries: Names of faculty, percentage of time charged against the grant and the amount

| | | |
|----------------------|-------|---------------------|
| Caurie, Matthew | 100% | \$ 7,584.38 |
| Hueth, Darrell | 15% | 3,858.09 |
| Lampe, Harlan C. | 77% | 36,732.42* |
| Pollnac, Richard B. | 50% | 8,551.44 |
| Sainsbury, John C. | 36% | 12,676.33 |
| Spaulding, Irving A. | 27.8% | 7,542.94 |
| Stevenson, David | 100% | 17,958.56 |
| Sutinen, Jon G. | 63% | 14,886.36 |
| Videus, Lars | 50% | 9,519.30 |
| Seay, Edmond | 16% | 614.79 |
| | | <u>\$119,924.61</u> |

B. Other: Percentage of time and the amount for each category

Management

| | | |
|------------------|------|--------------|
| Estes, Thomas S. | 100% | \$ 18,318.78 |
|------------------|------|--------------|

Library

| | | |
|-----------------------|------|--------------|
| Alexander, Jacqueline | 100% | \$ 14,893.17 |
|-----------------------|------|--------------|

Clerical

| | | |
|-----------------|--------------------|----------------------------|
| Hennessey, J. | ---- | \$ 159.00 |
| Neal, A. | 100% | 6,631.76 |
| Hartman, J. | 33.3% | 3,788.22 |
| Giambalvo, S. | 50% (13.27) adjust | 2,092.09 |
| Gammerino, J. | 33.3% | 70.50 |
| Colbert, E. | 100% | 3,116.25 |
| Palmisciano, A. | 100% | 48.17 |
| Davis, A. | 100% | 659.00 |
| Parker, T. | ----- | Prior year adjust (150.00) |
| Scheid, A. | ----- | 650.63 |
| Hicks, A. | ----- | 412.02 |
| Rathborne, G. | ----- | 70.00 |
| Logan, P. | ----- | 889.86 |
| | | <u>\$ 18,424.23</u> |

*Salary figure includes remuneration for two summers.

Table II - B (Continued)

Other Non-Professional

None

C. Fringe Benefits: As applicable for the above

(Includes fringe benefit charges on salaries for Student Support)

\$ 14,582.67

II. Student Support: Name of student, country of origin, amount of support per student

| <u>Name</u> | <u>Country of Origin</u> | <u>Amount</u> |
|------------------|--------------------------|---------------------|
| Jhaveri, J. | India | \$ 942.00 |
| Kasakollside, T. | Greece | 54.00 |
| Liu, C. | China | 898.50 |
| Yang, C. | China | 1,050.00 |
| Hall, B. | USA | 188.30 |
| Scheid, A. | USA | 4,100.00 |
| Logan, P. | USA | 5,499.00 |
| Epler, B. | USA | 4,714.00 |
| Yates, R. | USA | 4,714.00 |
| Johnson, J. | USA | 5,594.90 |
| Adriasola, A. | Chile | 794.37 |
| Medeiros, F. | Portugal | 1,000.00 |
| Klarnet, P. | USA | 1,000.00 |
| Holt, A. | USA | 27.50 |
| Hall, B. | USA | 46.00 |
| | | <u>\$ 30,622.57</u> |

III. A. Consultants: Total number and total amount

None

B. Guest Lecturers, visitors, etc.: Total number and total amount

None (15 visitors at no charge to grant)

IV. Travel: Total number of trips and total amount

A. Domestic ----- \$ 2,382.45

B. Foreign ----- \$ 8,970.39

Table II - B (Continued)

| | | |
|--|---|-------------|
| V. <u>Equipment</u> : | Number and description of items the individual cost of which is \$2,500 or over | |
| | None | |
| VI. <u>Library Acquisitions</u> : | Total amount | \$ 1,215.16 |
| VII. <u>Publications</u> : | Number and total amount | |
| | 2 | \$ 3,077.74 |
| VIII. <u>Other</u> (Such as telephone, postage, computer): | Total amount | |
| | Miscellaneous | \$ 1,028.51 |
| | Communications | 1,506.97 |
| | Supplies | 7,774.03 |

Table III - A

Requests for Assistance Received During Reporting Period July 1, 1976 to August 31, 1977

A. Requests Attended

| Description of Request for Assistance | Whom did you Assist? | Who Requested Assistance | Who Funded Assistance | Size of Effort | | Results of Assistance |
|---|--|--|---|----------------|----------|--|
| | | | | Dollars | Man Days | |
| 1. Feasibility Study for Program of Assistance in Agriculture, Fisheries and Education for the University Institute of the Azores | USAID and the University Institute of the Azores | AID and the University Institute of the Azores | AID/Portugal (Loan) | 40,009.00 | 130 | URI was awarded a two year \$586,925 contract to provide the desired assistance |
| 2. Two Fisheries Workshops - Costa Rica | Marine Fisheries Department, Costa Rica | Marine Fisheries Department | No Cost | ----- | 4 | Increased rapport between URI and enhanced cooperation in implementation of 211(d) projects |
| 3. Survey of Costa Rican Herring Industry | Government of Costa Rica | Ministry of Agriculture | No Cost - done in conjunction with 211(d) project | ----- | 15 | Ministry of Agriculture provided manpower, office and other facilities for implementation of 211(d) projects |
| 4. Biologic Analysis of Fish Population | Marine Fisheries Department | Marine Fisheries Department | No Cost - part of 211(d) project (stock assessment) | ----- | 5 | Additional manpower and cooperation, Marine Fisheries Department |
| 5. Evaluation of Fisheries Potential in Egypt | Government of Egypt/AID Mission | AID | AID | ?* | ?* | AID later funded a fisheries project in which URI faculty participated |
| 6. Evaluation of Inland and Marine Fisheries, Sierra Leone | Government of Sierra Leone/AID | AID | AID | ?* | ?* | Unknown |

* Direct contract between AID and URI consultants

Table III - A (continued)

Requests for Assistance Received During Reporting Period July 1, 1976 to August 31, 1977

A. Requests Attended

| Description of Request for Assistance | Whom did you Assist? | Who Requested Assistance | Who Funded Assistance | Size of Effort | | Results of Assistance |
|---|---|--|------------------------------|----------------|----------|---|
| | | | | Dollars | Man Days | |
| 7. Special Training for Kuwaiti Fisheries Administrator | Abdullah Salah Al-Haddah | FAO | FAO | 1,680.00 | 50 | Student completed special training and returned to Kuwait. |
| 8. Special Training for Chilean Technician | Luz Molina U. of Chile | FAO | FAO | 950.00 | 25 | She completed her training and returned to Chile. |
| 9. Special Training for Ecuadorian Fisheries Administrators (7) | 7 Ecuadorian Fisheries Administrators | Fulbright Commission Ecuador | Fulbright Commission Ecuador | 7,599.55 | 420 | Administrators gained new insights regarding fisheries management. |
| 10. Academic and special training for three members of the University Institute of the Azores | Ponte Tavares Dr. Helen Martins Prof. F. Machado | AID/University Institute of the Azores | AID | --- | --- | Ponte Tavares is still pursuing his Ph.D. program in Food Science. The other two have returned to the Azores where they are involved in the URI assistance program under an AID contract. |
| 11. Assistance in Development of Quality Control Directorate, Ministry of Commerce, Saudi Arabia; Select scientists and train graduate students | Proposed assistance to Ministry of Commerce, Saudi Arabia | U. S. Treasury | Not yet funded | --- | --- | URI response to request still under consideration at end of reporting period. (Contract awarded later for training students) |
| 12. Assistance to Institute of Nutritional Services and Food Technology of Iran in food science, upgrading curricula and training | Institute of Nutritional Sciences and Food Technology of Iran | The Director, INFST | Not yet funded | --- | --- | Response to request still under consideration (contract signed later). |

Table III - B

Requests for Assistance Received During Reporting Period July 1, 1976 to August 31, 1977

B. Requests Not Fulfilled

| Description of Request for Assistance | Whom Did You Assist? | Who Requested Assistance | Who Funded Assistance | Size of Effort | | Why Not Met? |
|--|-------------------------|-----------------------------|--------------------------|----------------|-------------|--------------|
| | | | | Dollars | Man Days | |
| NONE | NONE | NONE | NONE | NONE | NONE | NONE |

Annex I

List of Publications

- Amaya-F., J., T-C. Lee and C. O. Chichester. 1976. The intestinal adsorption of fructosylglycine-L-leucine. *Nutr. Rep. Intl.* 14:229-235.
- Caurie, M., T-C. Lee and C. O. Chichester. 1977. Underutilization of food technology resulting in losses of available food in West Africa. Part 1. A state-of-the-art paper.
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- Lampe, H. C. Institutions and organizations related to artisan and aquaculture fishery products. Pages 100-101 in T. S. Estes, ed., Proceedings of the Seminar-Workshop on Artisan Fisheries Development and Aquaculture in Central America and Panama. University of Rhode Island, Kingston, RI, 1976.
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- Lee, T-C. and C.O. Chichester. 1976. Physiological consequences of browned food products. Proc. IV Intl. Cong. of Food Sci. and Tech., Madrid, September 1974.
- Microbiological quality of fish for sale in Guatemala City. 1977. Report prepared for Instituto Centroamericano de Investigacion y Tecnologia Industrial (ICAITI) by the International Center for Marine Resource Development, University of Rhode Island, Kingston, RI. Guatemala City, Guatemala, ICAITI.
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- _____. 1977. Kinship links among small-scale fishermen in the Gulf of Nicoya, Costa Rica. University of Rhode Island, Kingston, RI, Anthropology Working Paper 17.
- _____. 1977. Perceptual adaptations to the marine environment. University of Rhode Island, Kingston, RI, Anthropology Working Paper 12.
- _____. 1976. Research for planned change among small-scale fishermen in the Gulf of Nicoya, Costa Rica: some preliminary results. University of Rhode Island, Kingston, RI, Anthropology Working Paper 11.
- _____. 1977. Sociocultural factors influencing success of intermediate food technology programs. Paper prepared for presentation in the Symposium: Appropriate/Intermediate Food Technology, Ann. Meeting, Inst. of Food Technologists, June 1977, Philadelphia, PA.
- _____. 1976. Sociocultural barriers to the transfer of technology. Pages 146-148 in T. S. Estes, ed., Proceedings of the Seminar-Workshop on Artisan Fisheries Development and Aquaculture in Central America and Panama. University of Rhode Island, Kingston, RI.
- _____, J. J. Poggie, Jr., and C. Gersuny. 1976. Risk as a basis for taboos among fishermen in Southern New England. J. Sci. St. of Rel. 15(3): 257-262.
- Robbins, M. C., L. C. Robbins, and R. B. Pollnac. Cooperative membership and optimism among small-scale fishermen in Panama. University of Rhode Island, Kingston, RI, Anthropology Working Paper 16.
- Rodriguez, D. B., Y. Tanaka, T. Katayama, K. L. Simpson, T-C. Lee and C. O. Chichester. 1976. Hydroxylation of beta-carotene on Micro-Cel C. J. Agric. Food Chem. 24:819-822.
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- _____, T-C. Lee and C. O. Chichester. 1976. Effect of Maillard reaction on the nutritional quality of protein. Proc. Spec. Symp. on Nutritional, Biochemical and Chemical Consequences of Protein Crosslinking, ACS Ann. Meeting.