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INTERNATIONAL
CENTER FOR
MARINE RESOURCE
DEVELOPMENT

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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ANNUAL 211(d) GRANT REPORT 1977 - 1978

I. REVIEW

Date Due: November 15, 1978
Date Submitted: December 28, 1978
Report Period: September 1, 1977 -
August 31, 1978

Grant Title: Institutional Development Grant
AID/csd 2455

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

Grant Program Director: Dr. Gerald A. Donovan

AID Sponsoring
Technical Office: Bureau for Development Support
Office of Agriculture

Statistical Summary

Period of Grant: May 7, 1969 - August 31, 1979
Amount of Grant: \$635,000, for total of \$2,010,000
Expenditures
for Report
Period: \$ 288,407.49
Accumulated: \$1,661,351.51
Anticipated for
New Year (1979): \$ 348,648.49

II. NARRATIVE SUMMARY

An AID mid-term review of progress being made on the current 211(d) Grant projects was scheduled for early November. Accordingly, it was deemed prudent to interrupt the drafting of this report in order to prepare for that important review. Following the review, it was decided that a few of the papers prepared several weeks earlier for inclusion in the annual report should be revised to reflect more current conclusions discussed during the review. The result of this decision is a report which has benefited greatly from the mid-term review discussions, at the expense of a short delay in its scheduled submission.

The five small-scale fisheries projects were making satisfactory progress by the end of the reporting year and were on or close to target dates, except for the Food Technology project. There were unforeseen delays in implementing this project as scheduled in the Work Plan because complex employment procedures hindered the hiring of the Research Associate until March. (According to the Work Plan this position was to be filled in January.) Nevertheless, by June the project was successfully underway.

The University responded to several requests for assistance during the year. Among them was a request by AID to prepare a proposal for assisting the University Institute of the Azores. This was a result of the feasibility study previously conducted by the University in response to an earlier request from AID. The proposal was accepted and a three-year \$586,925 contract was signed on January 12, 1978. Four URI professors responded to a request from the Universidad de Concepcion, Chile, made through ICMRD, to conduct a seminar there. A three-year contract was signed with the Institute of Nutrition Sciences and Food Technology of Iran to help improve food production in Iran. Another contract was signed with a U.S. research institute to train up to 60 Saudi Arabian students in food science to the M.S. and Ph.D. levels over the next five years. Negotiations were underway with Fundacion Chile to assist in fisheries and marine food production. Agreement was reached with a government-owned fisheries company in Peru to give short courses on factors affecting fish quality. The courses are to be funded by a West German development agency.

The ICMRD Library continued to function even more effectively as a result of the space it occupied in the new wing of the URI Library. Alterations were designed and made at no cost to the Grant.

III. DETAILED REPORT

A. General Background and Description of the Problem

As a consequence of earlier work done under the auspices of 211(d) funding received from AID in the small-scale fish-

eries area, the staff of ICMRD determined that governments in the LDCs were in need of some basic tools with which to make decisions on the development of artisan fisheries in such manner that scarce capital might be directed into activities most consistent with government food production and employment objectives. The basic information needs as identified were in: policy planning and development; project design and evaluation; and assessment and management of fisheries stocks. Having established these categories, it was proposed that research activities would be designed under each, as follows:

1. Policy Planning and Development

The basis for effective action with respect to policy planning includes the quality of information on which decisions are based and the structure and organization of the decision-making process. It was determined that an attempt should be made to develop a comprehensive model which would permit examination of policy planning alternatives, involving: (a) an evaluation of structures and organizations necessary to formulate policy and carry out its implementation at all levels of the development process and (b) the formulation of an economic framework within which development policy and plans might be evaluated. With respect to (a) a project was designed to analyze the infrastructure in which LDC small-scale fisheries policy is formulated and implemented, with a view toward determining minimal and optimal requirements to carry out the policy making and sector management functions effectively. To carry out the goals of (b) it was determined that there was a need to identify a methodology to organize and analyze information on the small-scale fisheries sector within a framework that would permit ready assessment of various development and policy alternatives. A longer term objective would involve the expansion of the framework to permit the evaluation of the impact of fisheries development activities on other sectors of the economy and vice versa. This activity would require the creation of a generalized economic model with subsets which adequately represent the fisheries sector; once designed such a model should be tested in the development context of one or more specific LDC environments. Since information systems in LDCs often generate data inputs which are limited both in quantity and quality it was planned that in this investigation an attempt should be made to assess minimum requirements for such analytical frameworks and determine the sensitivity and tradeoffs with varying quality and quantity of informational inputs.

2. Project Design and Evaluation

Effective project design and evaluation activities are similar to those involved in policy and planning decisions; however, in practice they function at a different level. Project design and evaluation is done by technicians whose informational requirements are of a different order. A greater level of detail is needed for successful project design and evaluation and in small-scale fisheries development it was felt that information was needed in the following areas:

a. Economic Information Systems

Work was designed to develop low-cost data collection systems utilizing appropriate modern sampling theory which could be used effectively to provide information for policy formulation, management and project design.

b. Sociocultural Constraints on Development

Sociocultural variables play key roles in the success of development projects. Failure to account for these variables between humans, their technology, and the environment will result in an incomplete analysis and potential development project failure. Investigations were designed to provide baseline data concerning socio-cultural variables linked to other major activities of the project; examine past and ongoing innovative behavior in the target group and its relationship to community social structure; determine existing formal and informal communication networks with regard to various aspects of artisan fishing; assess socio-psychological variables associated with innovations; and provide a framework for using indigenous social science skills in an integrated program.

c. Food Technology

Major problems in the artisan fisheries sector are the preservation of fish quality and catch loss. Projects were designed to investigate the processing parameters which significantly influence the chemical, physical and nutritional properties of traditional processing methods. Methods of preservation and handling will be evaluated to determine needs for technological modifications and research will be directed towards those modifications where targets of opportunity are favorable.

d. Knowledge Transfer Methodology

This activity was completed in 1977. The University submitted a State-of-the-Art paper covering literature searches on this subject, and analyses of technology transfers and the possibilities of linking small-scale enterprise methodologies with small-scale fisheries development programs.

3. Assessment and Management of Fish Stocks

Further exploration of resource assessment techniques will be undertaken in alternative environments to determine efficiency of methodology in the context of artisan fisheries. Information generated from this activity will feed into processes being developed under Policy Planning and Development and Project Design and Evaluation investigations.

B. Purpose of the Grant

The program funded by this two-year extension was designed to expand, strengthen and mobilize URI's capabilities and competence to permit the University to:

- continue to develop and expand its knowledge base and research output
- mobilize manpower resources to provide technical assistance in resolving LDC fisheries sector problems
- maintain and operate an up-to-date information capacity
- strengthen linkages to other LDC fisheries development institutions

C. Objectives of the Grant

1. Objectives Restated

a. Extended Knowledge Base

Grant funds were to be used to provide basic background material in the following areas: policy planning and development; project design and evaluation (including activities relating to economic information systems, sociocultural constraints on development, food technology, and fishing technology); and assessment and management of fish stocks in tropical waters. The results of the activities in these areas were to be made available in reports, professional papers and in other formal and informal exchanges.

b. Response Capability

Research and on-site projects were expected to improve the University's ability to respond to requests by U.S. and international agencies for professional and technical services related to LDCs.

c. Information Capacity

Funds and facilities were made available to expand the resources of the ICMRD Library inasmuch as activities under this Grant would involve the utilization of the ICMRD Library services. The resources of the Library were to be increased not only by direct funding but also through contributions from staff members working in the field who are expected to supply material for the collection. A network of exchange arrangements was also designed to increase the Library's resources.

d. Education and Training Capability

Staff and faculty expertise at the University would improve through the activities pursued under this grant, and educational and training programs should also benefit. It is expected that a number of foreign nationals will be enrolled in various marine courses, and that the University will be able to respond more effectively to requests for short-term and long-term special programs. A substantial number of URI graduate students should participate in projects at home and abroad and several theses should be based on their work.

Research planned under this grant was to be designed to produce models of economic aspects and resource projections and improvements of processing techniques and technology which would have general rather than specific value. Sociocultural studies were also planned to illustrate basic as well as specific facts and needs.

Inter-institutional linkages would be increased through formal professional exchanges in forums, workshops and conferences as well as casual interchanges that result when nationals work together on specific development problems.

2. Review of Objectives

This proposal was designed to create basic information which could be used in the establishment of

models whose applicability extended beyond the immediate countries in which the activities were pursued. The field of small-scale fisheries is relatively new and problems encountered in the pursuit of the objectives of this grant have tended to underline the paucity of information that exists in the field and the importance of efforts to obtain underlying information to facilitate future activities.

That there is a need for knowledge of government decision-making techniques and a need for information to guide decision-makers is undeniable. However, in pursuing this knowledge it has been found that the political situations within the countries have proved to be important. Because of a change in parties the thrust of the original proposal in Costa Rica had to be reassessed and for effectiveness it was necessary to reorient the proposal for the benefit of the new officials. The information ultimately acquired will be valuable but flexibility was needed to respond to changing forces.

This problem--of relating research to the political and actual realities--was apparent also in the economic aspects of the study. Field activities can rarely be pursued without the cooperation of local officials and/or other national/international agencies which might also be involved in the problems. Planned research in Guatemala under the economic framework sub-project had to be dropped when delays in the implementation of their fisheries development project became apparent.

Similarly, in the sociocultural project, work on fishermen cooperatives in Panama had to be rescheduled when the fishing vessels expected by the cooperative were not received on schedule.

Problems were encountered in the stock assessment project because the methodology had to be adjusted experimentally for use in the area. Additionally, the investigators feel that there is a possibility that the presently-existing models cannot be modified to meet the ecological conditions that exist in the region. On a less theoretical level the investigators also found that to meet their objectives they needed to explain the project more fully to local fishermen to get their full cooperation and raise the cash incentive for return of tagged fish.

A delay was encountered in the food technology project because of hiring procedures at the University. A Research Associate is now in the field and work is

continuing on the project. This project benefits from the involvement and cooperation of two research groups in the region--ICAITI, in Guatemala, and CITA, in Costa Rica.

As the projects progressed the increasing inter-relationship among them became apparent and cooperation among involved URI personnel resulted in more effective use of studies made at various levels.

In sum, the projects as envisioned have been modified by local situations which could not be anticipated. These difficulties have been as educational as the basic objectives in that they emphasize the need for intensive integration of projects with local agencies, adequate time frames to solve staffing problems, and the need for close liaison between all team members--both within and among the several projects. The problems also illustrate the need for adequate back-up staff at the University; because of requests from other AID agencies and from other organizations and LDCs, some of the senior staff had to reduce commitments or adjust schedules which slowed the progress of some of the projects.

3. Review of Critical Assumptions

Critical assumptions have changed considerably from those originally conceived when the projects were being formulated and during initial implementation. As noted in the previous annual report, there must be greater sensitivity to the prevailing political situation in countries where projects are being implemented. Principal Investigators must seek guidance on a continuing basis from the AID Missions and/or Embassies. A provincial or national election can easily change the parameters of an ongoing project because of changes of personnel in official positions; incoming officials may or may not extend the same cooperation to University personnel as did their predecessors. This is an important factor in long-range projects which should be given far greater attention in the future.

However, even with a change in national government involving modification of plans, a well-organized, cooperative project that involves substantial numbers of foreign government technical and professional personnel will survive. Costa Rica has provided an excellent example of this critical assumption.

IV. ACCOMPLISHMENTS

As has been mentioned, some projects have been slowed because

of conditions within and outside of the host countries and some projects have been amended to reflect changes and problems encountered in the field. By and large, schedules have been adhered to and all continue. A number of papers and articles have been prepared as a consequence of the work already completed and are listed in Appendix II. In addition to printed work many of the researchers have reported their findings at meetings both in the U.S. and abroad. In some cases, papers and other publications are being prepared in conjunction with officials or other specialists in the countries where work is ongoing.

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
Graduate Assistant - Philip Stuart-Starkey

Narrative Description

The objective of the resource assessment sub-project was to test systems of data collection and analysis useful for the management of tropical marine fishery resources and the development of the artisan fisheries which harvest them. Biological assessments of harvest potential are an essential prerequisite for coordinated development strategies which are currently being designed by ICMRD.

The theoretical framework selected for resource assessment was the Beverton-Holt yield model. The methodologies being tested were devised to estimate the parameters required by this model (i.e., growth and mortality rates). Two methods for estimating growth and mortality rates being tested in the Gulf of Nicoya, Costa Rica, are: (1) the analysis of length-frequency data; and (2) a tag and recapture study. Neither of these methods is new; what is new is their application to artisan tropical fisheries in the LDCs. A comparative evaluation of the adaptability and success of both methods in yield model analysis in Costa Rica should indicate their usefulness for management purposes in other LDCs.

With the cooperation of the Department of

Marine Fisheries of the Ministry of Agriculture, over 40,000 individual length measurements were collected in Puntarenas, Costa Rica, during 1976-77. Preliminary analyses of these data revealed several problems which impeded parameter estimation. A tag and recapture study was initiated during 1977-78 to provide additional information. A major output of the current two-year project will be a comparative evaluation of these two analytical techniques in terms of their usefulness in providing the information necessary to manage and develop artisan tropical fisheries.

Targets for Reporting Year

1. To tag 3,000 commercially-valuable fish in the Gulf of Nicoya.
2. To train Ministry of Agriculture biologists in tagging techniques and data retrieval.
3. To conduct cage experiments to determine tagging mortality and tag shedding rates.
4. To analyze catch composition and catch-per-unit effort information collected during 1976-77.
5. To continue the analysis of length frequency data collected during 1976-77 for growth rate estimation.
6. To analyze initial tag and recapture information.

Accomplishments

Reporting Year/Accumulative

1. With the collaboration of Ministry of Agriculture personnel in Puntarenas, approximately 2,200 fish were tagged during two tagging periods (February-March and June-July 1977). Tagging involved the preparation of two fishing gears--a 250 meter "lampara" net and a small trawl. Tagging was conducted aboard a rented commercial gill-net vessel. Initial tagging was preceded by an aggressive publicity campaign to encourage the return of tagged fish by commercial fishermen in the Gulf. Approximately 20 species were tagged. Of these, 6 species of commercial importance were tagged in sufficient quantities to permit parameter estimation.

2. Tagging could not have been accomplished without the participation of the biologists from the Department of Resource Evaluation (formerly the Department of Marine Fisheries). They were trained in tagging procedures and data retrieval and performed most of the tagging; they are solely responsible for the collection of tag return information.

3. Cage experiments were conducted during July 1978 but adverse working conditions hindered activities; the data collected was scanty and has not yet been evaluated.

4. Forty-one tagged fish had been recovered as of August 31, 1978. An analysis of the problems of returns led to (a) an increase in the reward paid for the return of tagged fish, and (b) increased efforts in communication with respect to the importance of the study to fishermen in isolated areas of the Gulf of Nicoya. Because the number of returned fish is still low, initial analysis of tag returns has been postponed until January 1979.

5. Work is underway on an analysis of catch composition, catch-per-unit-effort and annual length frequency information for the artisan fishery in the Gulf of Nicoya collected in Puntarenas during 1976-77 and a report of this analysis will be submitted to the Ministry of Agriculture in October 1978. Further analysis and evaluation of length frequency data continues.

Evaluation of Results

Project targets for the current reporting year have been met although analysis of initial tag returns and the comparative evaluation of the two methods for estimating growth and mortality rates have been delayed until more information is available. The number of tagged fish is somewhat lower than originally hoped for, but a great majority of the fish which have been tagged are of commercial importance. A two percent return rate within six months of tagging an initial 800 fish and within one month of tagging an additional 1,400 fish is encouraging. Preliminary analyses in January 1979 should reveal the value of this method as a means to determine yield model parameters and manage stocks for maximum sustainable yield.

Reports

Dr. Stevenson presented a paper in November 1977 at the 30th Annual Gulf and Caribbean Fisheries Institute, Cartagena, Colombia, "Management of a Tropical Fish Pot Fishery for Maximum Sustainable Yield."

A paper on the comparative evaluation of several analytical techniques used to estimate growth has also been prepared by Dr. Stevenson, "Growth Rate Calculation for Micropogon altipinnis from Length Frequency Data Collected in the Gulf of Nicoya, Costa Rica." This paper will appear in the Rev. de Biol. Trop. (University of Costa Rica) as "Management of Fishery Resources in the Gulf of Nicoya, Costa Rica: Methods and Preliminary Results." (in press)

Another report, co-authored by Dr. Stevenson and F. Carranza P., "An Analysis of the Fishery Resources Exploited by the Artisanal Fishery in the Gulf of Nicoya, Costa Rica," is being prepared and is scheduled to be published as a Technical Report by the Ministry of Agriculture in Costa Rica in 1979.

Total Expenditures

Accumulative - \$94,231.15
Reporting Year - \$52,024.31

b. Lack of Innovation Among Small-Scale Fishermen

Project No. 2 - Sociocultural Correlates of Developmental Change; Lack of Knowledge About Effective Message Design for Technology Transmission

Principal Investigator - Richard B. Pollnac
Co-Investigators - John Poggie, Jr.
Irving Spaulding

Narrative Description

A great deal of research has demonstrated the key role that sociocultural variables play in the success of development projects. Integrated projects concerned with fisheries development must therefore 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. The proposed research will extend our knowledge base concerning sociocultural factors associated with change among small-scale fishermen.

Sociocultural research already conducted in Costa Rica and Panama facilitate both further research and follow-up studies. Several years ago a FAO/BID loan for development of Panama's small-scale fishery was channeled primarily through newly developed and established fishermen's cooperative organizations. Just prior to the implementation of the FAO/BID project, Dr. Pollnac conducted research concerning fishermen's cooperatives in the Republic of Panama (Spring 1975). Since then he has produced numerous reports on his research.

Research on sociocultural aspects was conducted in 1976 in the Gulf of Nicoya and Panama. This facilitated further research and follow-up studies on the Pacific Coast of Costa Rica. Increasing efforts to develop the small-scale fishery of Costa Rica point to the need to extend activity to the Atlantic Coast to provide a better understanding of this generally neglected region. Food science, economic, and fisheries biology studies already underway in Costa Rica and Guatemala provide contextual information for initiating and continuing sociocultural research in these regions. The expansion of effort in Guatemala indicates a need for sociocultural data to provide parameters now missing from the multivariate analysis of the developing small-scale fishery.

Targets for Reporting Year

The following activities were planned for the year:

1. A report on follow-up research concerning fishermen's cooperatives in Panama.

2. Preliminary reports related to several of the following objectives of the subproject:

- (a) To examine past and ongoing innovative behavior and its relationship to community social structure and individual success in Central America where other subprojects are contemplated or ongoing.

(b) To provide baseline data concerning sociocultural variables linked to other major areas of the multidisciplinary project.

(c) To determine existing communication networks with regard to various aspects of artisan fishing in Costa Rica and/or Guatemala.

(d) To assess social-psychological variables associated with innovative behavior and the communication of innovations.

3. To further assess the value of the models and methodologies proposed in the sociocultural State-of-the-Art paper (Continuity and Change in Marine Communities).

The schedule for proposed work was:

September 1977-February 1978 - Pollnac to review previous research and formulate detailed operational plans. Coordination with other project leaders to be effected to insure that the data collected will be such as to permit maximum integration with other projects.

February 1978 - Pollnac scheduled to go to Panama.

March 1978 - Pollnac in Costa Rica and Guatemala initiating research.

April 1978 - Poggie to Guatemala to continue research initiated by Pollnac.

April-June 1978 - Pollnac to prepare reports at URI based on field work.

July 1978 - Spaulding to Guatemala to initiate work on social-psychological variables.

August 1978 - Spaulding to return to URI to prepare report on activities.

Accomplishments

Accumulative/Reporting Year

Accomplishments of Dr. Richard Pollnac

Because of requirements of Azores contract with AID he spent November and December 1977, in the Azores.

January 1977 - He presented a paper at a marine resource development workshop in Concepcion, Chile. After this meeting, he returned to Panama to conduct follow-up study on cooperative development among small-scale fishermen. Unfortunately, the expected loan funds for the fishermen's cooperatives which were to be issued by FAO/BID had not been received and the follow-up study was not possible. Interviews were conducted with fisheries personnel and with fishermen at two cooperatives (Chorrillo and La Playita) to prepare for the following year's work. He then proceeded to Costa Rica where he continued ongoing research in Puntarenas and made arrangements for Poggie's research in May.

July and August 1978 - Conducted field work in Azores in connection with that project. (This work integrates with the Central American project because it is concerned with sociocultural factors associated with agriculture and fisheries development work.)

Outputs

During this period, the following reports and papers were prepared:

Published Material--

Panamanian Small-Scale Fishermen: Society, Culture and Change, R.B. Pollnac, ed.

Illusion Susceptibility and Adaptation to the Marine Environment: Is the Carpentered World Hypothesis Seaworthy? J. of Cross Cultural Psychology, December 1977.

Gratification Orientations Among Small-Scale Fishermen in Panama and Puerto Rico, with J. Poggie, Human Organization, (scheduled for publication in Fall 1978).

Sociocultural Factors Influencing Success of Intermediate Food Technology Programs, Food Technology, April 1978.

Research Reports and Working Papers--

Investment Orientations Among Small-Scale Fishermen in the Gulf of Nicoya, Costa Rica, Anthropology Working Paper 19.

Variance in Perceptions of Fishing and Farming
Among Small-Scale Fishermen in the Gulf of Nicoya,
Costa Rica, Anthropology Working Paper 20.

Technological Change and Social Organization
Among Small-Scale Fishermen, Anthropology Working
Paper 21.

Research Plan for Social Soundness Analysis,
Report for AID Contract Number AID NE-C-1461
Portugal.

Sociocultural Aspects of Technological and In-
stitutional Change Among Small-Scale Fishermen,
Anthropology Working Paper 22.

Income Periodicity and Expectations of Goal
Attainment Among Small-Scale Fishermen in the
Gulf of Nicoya, Costa Rica, with M. Robbins and
L. Robbins, Anthropology Working Paper 23.

Papers Presented at Professional Meetings--

A Stochastic Model of Optimism Among Panamanian
Fishermen, with M. Robbins. To be presented at
the Symposium on Mathematical Anthropology,
Annual Meeting of the American Anthropological
Association, Houston, Texas, November 1977.

Technological Change and Social Organization
Among Small-Scale Fishermen, Seminar/Workshop on
Investigation and Development of Marine Resources
in the 8th Region of Chile, Concepcion, Chile,
January 1978.

Sociocultural Aspects of Technological and In-
stitutional Change Among Small-Scale Fishermen,
Paper presented at the International Symposium
on Modernization in Fishing Industries and
Communities, East Carolina University, April 22-29,
1978.

Accomplishments of Dr. J. Poggie, Jr.

May-June 1978 - Research in Costa Rica in-
volving in-depth interviews with fishermen, fish-
ermen's cooperative personnel and Eng. Milton
Lopez, Director of Plan Pesca. Interviews were
followed by the development of an interview sch-
edule which was used in a sample of 50 fishermen
to determine sociocultural factors related to
participation in the fishermen's cooperative

program. Arrangements were made to continue the research in 1979.

Following the field research, one week was spent at URI preparing a coding manual and coding the 50 interviews in preparation for computer analysis.

The following papers were prepared during this period:

Deferred Gratification as an Adaptive Characteristic for Small-Scale Fishermen, Ethos, Summer 1975.

Small-Scale Fishermen's Beliefs About Success and Development: A Puerto Rican Case, Human Organization (in press).

Gratification Orientations Among Small-Scale Fishermen in Panama and Puerto Rico, with R. Pollnac, Human Organization (in press).

Ritual Adaptation to Risk and Development in Ocean Fisheries, Paper presented at Society for Applied Anthropology Annual Meeting, Merida, Mexico, April 1978.

Poggie and Pollnac

In addition to the above described grant activities, Drs. Pollnac and Poggie have been co-investigators on a National Science Foundation project dealing with change among fishermen on the New England coast during the reporting period. The U.S. fishermen they have been dealing with manifest range of technologies which overlap with small-scale fishermen in developing countries. The co-investigators feel that they are broadening their experience concerning problems that can be expected when the small-scale fishermen in LDCs begin using similar technologies.

Accomplishments of Dr. Irving Spaulding

Dr. Spaulding's work was designed to examine social-psychological variables associated with innovative behavior and the communication of innovations. To develop a knowledge base, a technique was tested for ascertaining predisposition for change to which communication could be related. Data were collected in Limon, Costa Rica, during June 1978. Data analysis and report writing were done between July 1, 1978, and August 15, 1978.

Two documents are in preparation: "Technology Transfer: Measuring a Potential Target Group's Predisposition to Change," an assessment of orientation to change among selected fishermen in Limon, and "Technology Transfer and Communication: Adaptive Behavior and Message Structure," a statement on variables which are related to adaptive behavior and potentially provide a basis for the content and structure of messages related to technology transfer. Revisions are being made on the latter document.

Accomplishments, General

Targets for the reporting year were exceeded except with respect to the follow-up study of Panamanian fishermen's cooperatives which could not be completed because the FAO/BID loans had not yet been released to the cooperatives. This objective was therefore deferred until the next reporting year.

In addition, these studies provided investigators on economic projects with an insight into the status of the middleman and an understanding of fishermen's perceptions for the fisheries biologists. The interface between projects was a valuable aspect of the work.

Total Expenditures

Accumulative - \$61,036.93
Reporting Year - \$20,935.23

c. Underutilization of Food Technology

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

Principal Investigators: C.O. Chichester .
Spiros Constantinides
Tung-Ching Lee

Research Associate: Linda Nutley
Research Assistant: Dimitrios Kazantzis

Narrative Description

The objectives of this project are the improvement of the handling, distribution and preservation of the artisan fish catch in Costa Rica and Guatemala through the assessment of

local methods and the investigation of techniques for improvement. To achieve these objectives it will be necessary to:

1. Study the characteristics of predominant fish species, including chemical composition and storage stability, under various conditions in order to select the most efficient method of utilizing these species.
2. Improve and develop simple and economical methods of quality assessment and then test the feasibility of these methods on various fish species and fishery products.
3. Recommend and test appropriate handling procedures for the various fish species from the point of capture to the market place.
4. Assess the processing methods already employed in the region, which include salting, smoking, sun drying and freezing. The suitability of each species for certain methods of processing will be evaluated in accordance with the intrinsic characteristics of that species.

Work will be conducted in Costa Rica with the assistance of CITA (Centro de Investigaciones en Tecnologia de Alimentos) and in Guatemala with the assistance of ICAITI (Instituto Centroamericano de Investigacion y Tecnologia Industrial). These two research institutes will contribute manpower and facilities to the project. It is planned that the technical information produced will be made available through the production of booklets on the handling, preservation and processing of native fish species.

The research associate will be stationed in Central America to conduct and coordinate research work as outlined with the assistance of counterparts in the local research institutes. The research assistant will remain at the University of Rhode Island and provide back-up work involving laboratory work and equipment testing, and will also assist in the procurement of equipment and technical literature, as needed. The Principal Investigators will make periodic visits and direct activities from Rhode Island.

Targets for Reporting Year

1. October-December 1977 - Initiate preparation, recruit personnel, visit region and set up programs with counterparts in ICAITI and CITA, finalize work plans, and select working site. Order chemicals, supplies, and equipment.
2. January-May 1978 - Begin laboratory work on the technological characteristics of different species of fish, including chemical composition (fat, waste content, protein, non-protein, nitrogen, etc.) at different seasons. The results of these tests will provide information for suitable preservation method study and product development. Improve and/or develop simple methods for assessment of fish quality and test in the field on different species of fish at different locations, using different processed fish products, at different seasons, etc.
3. May-August 1978 - Improve handling and sanitary conditions of fish catch. In conjunction with ICAITI and CITA, prepare pamphlets on the handling and sanitary practices recommended for artisan fishermen and fish processing techniques.

Accomplishments

Reporting Year/Accumulative

Due to administrative problems, the hiring of the research associate was delayed. In addition, an overseas assignment for AID undertaken by one of the Co-Investigators delayed a scheduled planning visit to Central America. In March 1978 the research associate was hired and began work on the project.

In May 1978, Ms. Nutley and Dr. Lee visited ICAITI in Guatemala City, Guatemala, and CITA, in San Jose, Costa Rica. Agreements were developed between the two research institutes and ICMRD with respect to work on this project. During May and June 1978 the experimental design of the project was organized with CITA personnel; the fish species to be considered were designated (with the advice of ICMRD staff members working on the Economics subprojects); and CITA assigned three professionals and several technicians to the project. This group initiated the development of several marine-derived food products.

In July 1978 Ms. Nutley worked at ICAITI on the development of a standardized method for fish analysis that would be applicable in both areas of Central America. Field trips were made to the coast of Guatemala to identify fish species for analysis and to develop the methodology for the collection of samples. A State-of-the-Art paper on the technology of fish utilization in Costa Rica and Guatemala was initiated.

Ms. Nutley divided her time between Costa Rica and Guatemala. Both ICAITI and CITA have cooperated in every way and it is anticipated that progress will continue to be made toward the original schedule.

Back-up services continue to be furnished from Rhode Island. The Research Assistant helps procure chemical materials and equipment, as needed, and relevant technical literature. In addition, he has been checking the chemical and microbiological methods used for assessing fish quality and then advising Ms. Nutley on the applicability (sensitivity, rapidity, reproducibility, etc.) of each method. He has initiated the use of the Torrey Fish Meter to determine the freshness of fish. This meter may be applicable to situations prevailing in Central America but preliminary experimentation is being done at Rhode Island where electronic difficulties are more easily repaired or modifications made in its operation. A thorough investigation of the variables affecting the use of the Torrey meter was made on several species of fresh fish and of these same species stored in ice for varying periods. The readings given by this meter, the microbiological test and the TMA test for fish freshness, were correlated.

In Costa Rica two students have started their theses under the partial tutelage of Ms. Nutley in the assessment of fish quality by organoleptic, chemical and microbiological methods. "Correlacion entre metodos microbiologicos, quimicos, sensoriales y instrumentales para medicion del estado de frescura de especies de pescado en Costa Rica," is in preparation by Hannia Jimenez Masis, and "Estudio de alternativas de manipulacion de pescado fresco," is being written by Emilio Gutierrez Quesada.

Since Ms. Nutley is experienced in the sensory evaluation of food, work has been done on selected

species of fish with respect to proximate analyses, freezing preservation and organoleptic testing after varying storage periods. She has also been asked to give a course on sensory evaluation at a university in Caracas, Venezuela. Methods for the processing of fish (salting and drying) will be investigated and product development (the use of fish in different forms) will be attempted.

Outputs

Among the papers prepared or in preparation, are the following:

Evaluacion de Calidad Microbiologica en Pesca Artesanal, en la Region de Puntarenas (Golfo de Nicoya), CITA/ICMRD, Costa Rica 1977.

Microbiological Quality of Fish for Sale in Guatemala City, ICAITI/ICMRD, Guatemala, 1977.

The findings of these reports are being analyzed and will be used as guidelines for future work on fish quality and for making recommendations to the appropriate local and U.S.-based offices, persons, or agencies.

As mentioned earlier, it is planned to produce booklets on various phases of the subjects investigated for use in the region.

In summary, these activities are designed to develop food technology in the region with respect to fish utilization. The involvement with the research institutes in the region is beneficial both for the institute staffs and URI personnel.

Total Expenditures

Accumulative - \$72,945.54
Reporting Year - \$22,777.68

d. Knowledge Transfer Methodology

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

Principal Investigator - John C. Sainsbury

This project was completed in 1977 and a State-of-the-Art paper was submitted.

Total Expenditures

Accumulative - \$29,237.91
Reporting Year - \$ 5,530.01 (expenses incurred in
prior year but not
paid until reporting
year.)

e. Economics

Project No. 5a - Economic Framework

Principal Investigators - Harlan Lampe
Jon Sutinen

Visiting Assistant Professors - Douglas Maxwell
(resident abroad)
Ahmed Hussen

Research Associate - William Kolberg

Research Assistants - Paul Medeiros
Philip Logan
Bruce Epler
William Ralph

Narrative Description

The purpose of this project was to provide a framework for the economic evaluation of policy options in fisheries development. In devising such a framework it was felt that the following steps should be pursued:

1. The further development of a preliminary model.
2. The testing of the preliminary model in Costa Rica.
3. The modification and refinement and/or re-definition of the model, if necessary.
4. Further testing in both Costa Rica and Guatemala.

The testing and modification of the preliminary framework was designed to inter-relate with work on economic information systems. Careful consideration will be given to trade-offs involved in the improvement of decision-making and the costs of providing data as well as the costs of developing and operating the model framework. This project will be closely coordinated with the political project (Decision-Making Infrastructures for Artisan Fisheries) and will also use infor-

mation generated in sociocultural studies.

This work is important because the goal is to produce for developing countries a framework that will make possible a more precise and comprehensive evaluation of policy and management decisions relating to fisheries development. Such information would help to reduce errors in government investment programs and enable planners to direct scarce capital into those activities most consistent with food production and employment objectives.

As designed, the project will employ standard regression and other statistical techniques in data analysis. The modelling of the economic structure will require the use of mathematical programming techniques.

Differences in models will exist between Costa Rica and Guatemala. The Guatemala model will be directed to enterprise management at a variety of levels. The Costa Rica model is directed to evaluating choices among alternative development strategies and projects. In consequence, it will deal with more general economic issues.

Considerable support is expected from the various governments. Liaison and support in Costa Rica will be received from the Office of the Vice Minister of Agriculture for Science. The Ministry of Agriculture there will provide office space. Three Costa Rican professionals will be involved. El Salvador has indicated it will assign one professional and two technicians to this and the related economic information system project. Guatemala will provide one professional and two technicians.

Outputs expected from this project include the following:

1. The creation of economic models at two decision-making levels. One model will be at the policy level where decisions are required on aggregate or macro problems and the other will be more useful at the micro management level, where decisions are required in directing the combination of resources in the existing harvesting, processing, distribution and marketing systems.
2. Effective decision-making systems will be

designed for Costa Rica and Guatemala.

3. Over the project period in country manpower will be trained who will be capable of employing the models.
4. There will be an enhancement of the skills of professionals at URI in the solving of development problems at the policy and management levels.

Targets for Report Year

September 1977-March 1978 - Project design in consultation with the countries involved.

September 1977-March 1978 - Preliminary model designs.

April-July 1978 - Testing of models.

July-December 1978 - Model Modifications.

Accomplishments

Accumulative/Reporting Period

Work on the Guatemala model was postponed indefinitely because the cooperative development project for the country was delayed and it was unclear when--if ever--it would be reinstated.

A preliminary model for Costa Rica has been developed; however, further development of the model has been postponed to devote the project's resources to evaluating the current state and future potential for marine fisheries development in Costa Rica. The URI/ICMRD team is working with the fisheries development planning group appointed by the President of Costa Rica (headed by Eng. Milton Lopez, Department of Fisheries) to analyze all existing data on the fisheries and related government institutions. The results of this analysis, the "Diagnostica," will provide a foundation for formulating future fisheries policy in the country.

The project is now even more closely linked with the government decision-making project since both economic and public administrative analyses will be used in the integrated package. This has postponed the development of the abstract economic model but the framework for decision-making being developed has a greater chance of being adopted

since it is being developed with Costa Rican decision-makers as principal participants.

Using the data collected from Costa Rica, separate disaggregated analyses of the harvesting and marketing sectors were conducted during the period of the report. Among the analyses performed were the following:

1. Descriptive statistics were utilized to visualize the nature and economic structures of the artisan fishery industry at the Gulf of Nicoya. This analysis includes information on harvest (production) by major species and by gear types, production per unit effort by gear type, variation of market price among the major species caught and seasonal variations of the market price, etc.
2. Short-run production functions were estimated for fishing vessels using different gear types. In general, this approach will help to understand the economic efficiency and the allocation of resources (at the margin) among the firms involved in the fishery industry at the harvesting sectors.
3. Research is underway to evaluate the market structure and performance of the wholesale and the retail market. In these sectors an attempt will be made to evaluate the project margins and the effect of integration on the performance of the market.

A paper has been prepared by Ahmed Hussen and J.C. Sutinen, "Estimation of Production Functions for the Artisanal Fishery of the Gulf of Nicoya (Costa Rica)," setting forth some of these results.

Total Expenditures

Accumulative - \$293,855.18
Reporting Year - \$110,335.30*

*These are the reporting year expenditures for Project No. 5 and No. 5b (following), as well as the accumulative expenditures for prior year projects.

Project No. 5b - Economic Information

Principal Investigators - Jon Sutinen
Harlan Lampe

Visiting Assistant Professors - Ahmed Hussen
Douglas Maxwell
(resident abroad)
Research Associate - William Kolberg
Research Assistants - Michael Shank
Allen Scheid

Narrative Description

The general objective of the research on economic information systems was the development of cost effective systems of data collection, processing and analysis that link directly to the formulation of fisheries development policy and management of development programs. Reliable data are important for development programs; yet in LDCs financial resources are limited and there is a shortage of trained personnel and inadequate computer facilities, all of which are necessary to handle modern sampling and statistical methods. Decisions have to be made on the type and quantity of data that will yield the highest pay-offs for development subject to the constraints on research and of time.

Research designed under this project is an outgrowth of work done under AID auspices during 1975-77 in El Salvador, Guatemala and Costa Rica. At that time methods for collecting technical and economic data on the production, distribution, and consumption sectors were tested. Further refinement of these collection methods will be pursued to make them more efficient in producing quality data for development program planning.

Specific objectives with respect to the development of a comprehensive information system were broken down into six phases: design and planning; testing and training; data collection; data processing; evaluation and modification of the collection and processing activities; and data analysis. The major objective was the development of in-country capability in each of these steps. In Costa Rica the goal was the refinement of the extant data collection process based on an analysis of the country's existing systems in both the harvesting and marketing sectors and its capabilities in processing and analyzing the generated data. The work designed for El Salvador involves reactivating the collection of data from the harvesting and marketing sectors using improved methods, plus expanding their capabilities for processing and analysis.

The work planned for Guatemala involves creating an entirely new program for the harvesting sector, including all the six phases listed above.

Targets for Reporting Year

Survey activities were designed to be conducted in the three countries for varying periods. Much of the data analysis and the development of efficient systems for managing data was to be done at the University of Rhode Island; this work, requiring extensive computer involvement, would be essential in providing data management and analysis systems that could be used on facilities available in developing countries.

The projected schedule was:

September 1977-January 1978 - Sutinen to develop preliminary sampling design and plans for each country.

February 1978 - Sutinen to visit each country and pre-test materials, identify resources and initiate program.

March-May 1978 - Sutinen and graduate students to prepare detailed program for each country.

June 1978 - Sutinen and graduate students inaugurate programs. Field work to continue throughout summer and end with a preliminary analysis of the programs.

Accomplishments

Accumulative/Reporting Year

Following the planned visits to the three countries in February 1978 the project's specific objectives were modified to correspond with the interests and capabilities of each country.

The primary objectives for field work in Costa Rica included the evaluation of existing systems which had been initiated by ICMRD under AID auspices in 1976, observation of current operations, and an analysis of the ability of the systems to deliver needed information for decision-making. Data were also to be gathered on some aspects of the marketing system for fisheries.

In 1976 three sources of data from the harvesting sector had been created: (1) data for one year based on direct interviewing of fishermen drawn from a random sample; (2) data for one year based on bookkeeping systems kept by a non-random group of fishermen; and (3) data based on landings of Primary Buyers. In 1978 surveys concentrated on Primary Buyers and transporters of white fish along the Pacific Coast, as well as restaurants and supermarkets. A consumer survey was planned for a later time. These surveys were designed to fill in existing gaps in knowledge on the marketing system for fish in Costa Rica. A major portion of work time in the summer of 1978 focused on the Primary Buyers and transporters as previous attempts had shown that information was difficult to obtain from this group. The restaurants and supermarkets survey was included to check flows of fish not moving through retail outlets and to provide descriptive information on this aspect of the marketing system.

In addition to this survey work, all fishery data which had been collected by the Ministry of Agriculture was inventoried and the collection and processing methods used were described. All the people who handled data collection for the Ministry were interviewed. This information will be used to design an optimal fishery information system for the Ministry. Processing the previously collected data was begun at the School of Mathematics of the University of Costa Rica, with the assistance of ICMRD staff.

The focus of this work has been the small-scale fishery and has been confined to looking at cost effectiveness of alternative systems; future plans include observation of all systems of fisheries information and recording to determine the most cost-effective system for collecting and processing. The emphasis will be on identifying the best set of data for Costa Rica.

Excellent cooperation was received from Costa Rican officials; at least five staff members from the Ministry of Agriculture participated in the survey work; some of these people had been involved in the earlier project.

Field work in El Salvador concentrated on a survey of the transporter-Primary Buyer sector of the marketing system. This sector is felt to be a key one due to the important role played by the

transporter in financing the marketing system. The survey attempted to obtain information on volume, value, prices and costs and a description of practices (handling, shipping, frequency of trips, etc.). Investigators attempted to get a historical perspective on the evolution of the systems. As in Costa Rica, it was found that obtaining information from this sector is difficult; the transporter is highly mobile and intensely competitive and consequently suspicious of questions concerning his activities.

An attempt was made to modify and refine survey methods which had been previously used in Costa Rica, Guatemala and El Salvador. Processing and analysis was begun under guidance of project personnel of data obtained from this survey and from earlier surveys. Local people were trained both in the collection and processing of the data.

Collection of data from the harvesting and marketing sectors was not reactivated as planned. It was the opinion of the Chief of the Fishery Service, Sr. Mauricio Machon, and his assistant, Sr. Carlos Fuentes, that it was more important to fill in the gaps of information about the artisan fishery to better facilitate development planning in the country. Evaluation of the results of this survey are currently underway.

Other sectors of the fishery in El Salvador were investigated for use in designing an effective interview structure on marketing aspects. The Office of Fisheries and the Information Division of Natural Renewable Resources cooperated in the activity.

The Fisheries Service is continuing the collection and processing of economic information on the wholesale and retail marketing of fresh fish in the country.

A paper has been prepared describing and evaluating an economic survey methodology applied to a marketing system in a developing country, "An Application of Economic Survey Methods to the Fish Markets of San Salvador," by M.D. Shank and J.G. Sutinen. Mr. Shank is writing his Master's thesis on the economic efficiency of the transporter-Primary Buyer sector of the marketing system.

The collection of information on the harvest-

ing sector in Guatemala was postponed. The plan had been designed to coincide with the introduction of several new vessels to the fishery as part of a development project. The construction of the vessels was delayed and because of this it was decided not to implement this section of the project.

Overall Accomplishments

Much valuable knowledge and experience has been gained from this project. Throughout there has been an emphasis on the evaluation of previous experience in order to develop knowledge on two aspects: (1) costs of the surveys in Costa Rica and El Salvador and (2) knowledge of practical aspects, i.e., techniques, important aspects, more effective structures, etc.

As a result of the work done in Costa Rica the methodology has been refined and application of these methods resulted in the collection of high-quality data at a low cost. This information contributed to the body of knowledge relative to techniques for devising optimal economic survey data for use in developing countries.

Total Expenditures

See Project No. 5a.

f. Decision-Making

Project No. 6 - Decision-Making Infrastructures
for Artisan Fisheries Development

Principal Investigator - Timothy M. Hennessey
Research Assistant - Charles Donmoyer

Narrative Description

In the developing nations, artisan fisheries development is receiving increased government attention with consequent emphasis on planning and improved financing. However, the policies and the government agencies mandated to carry out such change are often poorly designed and activities are rarely integrated; poor management and conflicts of control and power exist among and between many of the government agencies involved in the administration of fisheries programs. In addition, there are a proliferating number of agencies at the national, regional, and international level impacting on the administration,

planning and financing of fisheries development.

Due to these circumstances, integrated projects concerned with fisheries development must take into consideration the politics of government decision-making and the techniques involved in the formulation and implementation of fisheries policy. Research under this project was designed to increase the knowledge base concerning governmental and administrative facts as these relate to small-scale fisheries development.

The policy approach was designed to be problem oriented with respect to questions asked, contextual in the consideration of factors in the policy process and multi-method in procedures. Questions to be investigated included: (1) what are the trends in the realization-inhibition of fisheries policy? (2) what institutional factors condition such trends? (3) what projections characterize the probable course of future developments? (4) what policy alternatives will bring the greatest net realization of a desirable small-scale fisheries policy?

If fisheries policy is already formulated, investigations will concentrate on the complex chain leading from government approval through various institutions and agencies to the small-scale fisherman. Understanding this policy chain, while difficult, would be essential to the understanding of fisheries development.

Targets for Reporting Year

The preliminary phases of the research were designed to focus on governmental policy and institutional delivery dimensions of artisan fisheries development in Costa Rica and Guatemala. The phase one goal (January-May 1978) was to identify the key governmental institutions and decision-makers who impact on artisan fisheries policies and administrative delivery systems.

In phase two (July-August 1978) a comparative research design was to be constructed and an interview instrument was to be administered to key decision-makers and agency heads related to small-scale fisheries policy formulation and implementation; in addition, a strategy was to be formulated appropriate to establishing institutions and agencies to reach policy objectives.

Accomplishments

Accumulative/Reporting Year

The Principal Investigator visited Guatemala, El Salvador and Costa Rica. Government officials and university experts were interviewed. In each country government operations were analyzed to determine the major institutions and decision-makers responsible for marine resource development.

As a result of these investigations it was decided that a model of marine resources administration and policy would be most successfully developed in Costa Rica since in the other two countries policy and administrative development were not too sophisticated. It was decided to focus on a new institutional structure in Costa Rica - INDERENA (Instituto de Desarrollo de los Recursos Naturales Renovables). INDERENA had been created from existing organizational units with the primary purpose of maximizing marine development and was an attractive agency for study since it represented a promising organizational model whose structure and functions might be transferred to other developing countries. Executives in the Costa Rican government were interviewed by the Principal Investigator with respect to features of the new agency, i.e., projected structure, goals, financing. In the construction of the research design documents and appropriate support materials were obtained and examined. Investigation was focused on the policy formulation process before reorganization into INDERENA and the policy as evolved.

In May 1978 a new government was elected in Costa Rica and the new executive decided to postpone implementation of INDERENA until a thorough survey of marine resources had been conducted. This survey--the "Diagnostica"--was designed to coordinate research on all aspects of the marine sector. To facilitate the goals of the "Diagnostica," the Principal Investigator arranged to restructure his project and redirect his efforts to analyze the administrative structure and organizations within the government agencies and nation. These results will be integrated with investigations in other sectors to aid the new President in making policy decisions. The Principal Investigator plans to return to Costa Rica early in 1979 to complete background analyses of the administrative organizations and prepare an

analysis and recommendations for restructuring governmental agencies. A closer link has been developed with Investigators on the economic project who are also participating in the "Diagnostica." It is hoped that marine resource development in the country will be maximized through the creation of an effective governmental structure--based on economic inputs from the economic projects and the work of the Principal Investigator on the analysis of government structures--which will effectuate government policy. Ultimately, a model will be designed based on the techniques employed in this specific case which will be of value in other LDCs.

The Research Assistant is participating in the preparation of a document on development administration.

Total Expenditures

Accumulative - \$9,016.24
Reporting Year - \$9,016.24

B. Objective/Output No. 2 - Response Capability¹

Narrative Description

The 211(d) Grant was extended for the period 1977-1979 for the purpose of focusing the efforts of the University's staff on basic aspects of small-scale fisheries. The goal was to provide background studies whose techniques and conclusions would be of general value in all LDCs although specifically addressed to problems in Guatemala, El Salvador and Costa Rica. The research projects pursued under 211(d) grants during the period 1969-1974, together with the current small-scale fisheries project, have helped the University faculty acquire additional knowledge and experience which enhanced their ability to respond promptly and effectively to requests for assistance from abroad. This response capability is the second objective of the grant extension.

Targets for the Reporting Year

The general target was to further improve the ability of the University to respond to requests for assistance from LDCs in resolving their marine resources problems. The specific goal was the implementation of an integrated project in artisan fisheries in Central America which

¹See also Section VI.

might serve as a prototype for development of this sector and ultimately enhance the value of the artisan catch as a protein food source within LDCs.

Accomplishments

Accumulative

Since the transition from the original development phase (1969-1974) to the utilization phase (1975-1979) the University has received some 30 formal and informal requests for assistance and has responded positively to all but three of them. In one instance, a request from Chad via AID, it was not possible to meet the required time schedule for providing a member of a team being formed by AID to go to Chad. In another (FAO-Sri Lanka) the University did not possess the requisite expertise for simulation projects. In the third instance (University of Dar es Salaam) the University advised that the request should be referred directly to the AID Mission.

Project Activities

As detailed in Section IV, Accomplishments, Principal Investigators of the Economics and Government Decision-Making projects, responded to requests from Costa Rican and Guatemalan officials to modify somewhat the initial Work Plan objectives to provide information which would be helpful to those governments and to the projects themselves. Not only did this result in even greater cooperation, but in Costa Rica government agencies supplied manpower which facilitated implementation of these and related projects.

Non-Project Activities

Azores

AID awarded a three year contract, effective January 12, 1978, through July 11, 1980, in the amount of \$586,925 to the University of Rhode Island for the purpose of assisting the University Institute of the Azores in providing agriculture, fisheries and extension services. This contract is an outgrowth of a feasibility study conducted by URI faculty under the auspices of ICMRD, as requested by AID, during the period November 1, 1976, to April 15, 1977, at a budgeted cost of \$40,009.

A Co-Principal Investigator, Dr. Donald McCreight, together with his family, took up residence in the Azores in July 1978 to implement the program on site. The other Co-Principal Investigator, Dr. John Sainsbury, backstops the project on campus. He will exchange roles with Dr.

McCreight next year. A substantial number of URI faculty will be involved in the project, and several Azorean trainees will come to URI for both degree and non-degree work. ICMRD provides administrative support for the project.

The University's ability to respond to this AID request was of considerable importance to the United States and of special importance to Rhode Island with its large Azorean/Azorean-descendant population. The response capability in this instance clearly was made possible in large measure through the training and experience provided by the 211(d) Grant.

Chile

In response to a request from the Universidad de Concepcion, the Director of ICMRD, in his capacity as Dean of the College of Resource Development, authorized a member of the faculty to join two other faculty members from the College of Arts and Science and one from the Graduate School of Oceanography, to visit that University to conduct a seminar workshop. There was no cost to the Grant.

Costa Rica

The Vice President for Research of the University of Costa Rica raised the question of establishing formal cooperative programs with the University of Rhode Island in marine science, specifically fisheries and the Law of the Sea. Dean Donovan, as Director of ICMRD, responded in a letter welcoming the idea and proposed that such a cooperative venture also include food science and technology. He informed the Vice President that Dr. David Stevenson, then in Costa Rica implementing the subproject Stock Assessment, would call on the Vice President to discuss details of such a cooperative arrangement. (Dr. Stevenson speaks fluent Spanish and had lectured at the University of Costa Rica.) As a result of that visit it was agreed that the Vice President and the Director would meet the next time either was in the other's country to prepare a proposal for the cooperative effort and to obtain financing for it.

Early in August 1978 the Tinker Foundation (New York) expressed an interest in funding an educational project. The University initiated discussions with representatives of the Foundation in an effort to obtain funds which would permit URI to respond to the request from the University of Costa Rica at the earliest possible date. It is expected that some funding to further this project will be received in the near future.

Ghana

The Vice Chancellor of the University of Cape Coast, Ghana, who had visited ICMRD the previous year, contacted a member of the faculty of the College of Resource Development about the possibilities of cooperation in the field of fisheries training and research. His inquiry was referred to the Dean who expressed interest in the suggestion and advised that it would be considered in connection with the development of ICMRD's proposal for participation in Title XII programs.

Guinea-Bissau

Two officials of the Government of Guinea-Bissau visited URI in December 1977 to discuss the need for a small-scale fisheries program in their country and to ask for assistance. They were informed that URI, through ICMRD, would be prepared to assist if necessary funding arrangements could be made.

In January, at the request of USAID, a member of the faculty visited Guinea-Bissau to assist AID officials in preparing documentation for a small-scale fisheries development project in that country. As of the date of this report, the University has not been advised whether such a program will be approved by AID for Guinea-Bissau. However, the University has been asked to develop a two-year (non-degree) fisheries training program for twenty young men from Guinea-Bissau and is now considering whether it can respond to the request.

Guatemala - ECID

The Director of the Permanent Secretariat of the Center for Central American Economic Integration corresponded with a faculty member involved in the 211(d) project in Guatemala, regarding the possibility of funding under Title XII for expanded economic fisheries studies in the area. The matter was referred to ICMRD which will keep it in mind for possible implementation when Title XII programs for such purposes are authorized.

Kuwait

The Office of International Fisheries, NOAA, Department of Commerce, asked ICMRD in a letter dated June 23, 1978, to arrange an individualized 12-month program for an FAO Fellow, similar to the one previously arranged for another Kuwaiti fisheries administrator. ICMRD has agreed to arrange the program as requested.

Republic of China

In June 1978 ICMRD responded to a request received from a member of the Fisheries Division, Joint Committee on Rural Reconstruction, Taipei, Republic of China, agreeing to develop a specialized short-term training program in fishing boat design. The Graduate School of the U.S. Department of Agriculture eventually took charge of arrangements as the official training programmer for officials from the Republic of China.

As of August 1978 it appeared that a Chinese fisheries specialist would begin his training at URI in January or February 1979.

Sri Lanka

In mid-1978, FAO addressed a circular letter to the University inviting it to submit a cost proposal for the Development of a Simulation of Fish Marketing Activities - Fish Business Management Game. After due consideration, the University decided that it was not qualified to undertake this kind of project.

Sudan

The Program Director of the Catholic Relief Services at Khartoum, Sudan (who is a New Englander) wrote to ICMRD in April 1978 requesting published information on the use of fish waste as fertilizer--specifically the use of herring by the Indians and later the Pilgrims to fertilize their corn crops. The ICMRD Librarian conducted a search of available publications and contacted knowledgeable faculty and prepared an exhaustive reply to the inquiry. In essence, she advised that available literature and experience indicates that while fish can be used as fertilizer, it may be more economical to process fish waste into feed and use animal waste.

It is of interest to note that the Director was inspired to make his inquiry as a result of reading a 211(d) Grant-sponsored paper by Dr. Richard Pollnac, Principal Investigator of the 211(d) Sociocultural subproject, on small-scale fisheries in Panama.

Tanzania

Over the past year and a half, faculty and staff members of the University have received letters from members of the faculty of the University of Dar es Salaam requesting information on some form of assistance, including more copies of the ICMRD report on the International Conference on Marine Resource Development in Eastern Africa,

held at the University of Dar es Salaam in 1973. There apparently continues to be interest in the publication and the information and suggestions it contains.

The latest request, in September 1973, proposed further cooperation between the two Universities, with some assistance in funding. The writer was informed that URI would be quite happy to cooperate but it could not intercede in behalf of that University in the matter of U.S. funding. It was recommended that the proposal be discussed with the AID Mission in Tanzania.

Western Samoa

In response to a request from FAO in May 1978, ICMRD agreed to develop a 22-month fisheries training program on the specific problems of Western Samoa which was designed to prepare a young Samoan, Mr. Fili Suafoa, for the position of Chief Fisheries Officer. Mr. Suafoa arrived at URI in late August 1978 to begin his studies.

Accomplishments, Report Year Summary

As the above inquiries indicate, URI (and its International Center for Marine Resource Development) is becoming well-known abroad for its efforts to assist in resolving fisheries problems in the developing countries. There is presently more interface between faculty and foreign counterparts than institution to institution, but one complements the other. In only three instances (Chad, Sri Lanka and Tanzania) did the University feel unable to make a positive response.

These reporting year accomplishments, together with previously reported accumulative accomplishments, provide further support for the view that the 211(d) Grant has greatly enhanced the ability of the University to respond to requests for assistance on a wide variety of fisheries, educational and marine food/nutrition matters, thus meeting both a grant and a University objective.

Total Expenditures

It is not possible to quantify expenses in this project.

C. Objective/Output No. 3 - Information Capacity

Narrative Description

The growing reputation of ICMRD and its consequent increased "visibility" has affected Library operations. Increasingly, the Library receives requests from countries

and international agencies and individuals in both the developing and developed sectors; these inquiries range from simple requests for specific materials to questions requiring in-depth response involving literature searches and personal contacts with URI experts. The Librarian also provides Library services and borrowing privileges to undergraduate and graduate students in the various marine programs at the University. To accommodate this expanded usage has required a great deal of staff time and effort and increased expenditures for documents, books and supplies.

Targets for Reporting Year

In October 1977 the ICMRD Library was scheduled to move from quarters in Ruggles House (which it had occupied since 1973) to a section on the second floor of the Main Library Building. Renovations were to be made in this area to accommodate the collection. The move would facilitate the response capabilities of the Librarian since there would be direct access to all the bibliographic and reference tools in the Main Library. It has always been the ICMRD Library policy not to duplicate the basic collection of materials in the marine sciences available at the Pell Library or the Main Library. This policy has made possible maximum collection development with minimal expenditure. For the University the funding of this position by AID has provided a professional librarian with expertise in the applied marine field, which enhances URI Library facilities and capabilities with minimal institutional expense in an area in which the University continues to develop a unique specialty.

Accomplishments

Accumulative/Reporting Year

The ICMRD Library collection now consists of at least 4,000 documents and 150 books, in addition to an extensive collection of newsletters and serial publications from foreign countries, international groups and U.S. agencies and organizations.

The Library also is the distribution and archival center for publications of the staff and the Librarian serves as editorial coordinator for formal publications issued by ICMRD. During the current report period the Librarian supervised the publication of Panamanian Small-Scale Fisheries: Society, Culture and Change, edited by Richard B. Pollnac, and assisted in the preparation of other material. Over 500 copies of Panamanian Small-Scale Fisheries have been distributed either directly through the ICMRD Library or the distribution center of the URI Marine Advisory Service.

In addition, more than 300 other publications were distributed through Library facilities.

Besides responding to the information and reference needs of faculty, staff and students in URI marine programs--in such diverse areas as aquaculture, resource economics, fisheries and marine technology, marine policy, food science, oceanography, and ocean engineering--the Library also serves as an information resource for other individuals, libraries, or agencies in the United States, and also responds to requests from foreign nationals, businesses and international agencies.

To illustrate the diversity of material handled by the ICMRD Library some of the requests received included: information on the use of fish for fertilizer in a village in the Sudan; questions relative to marine dredging in the Philippines; reference materials in Spanish for a program in fisheries and food technology at the Fundacion La Salle in Caracas, Venezuela; data on fisheries resources in the west central Atlantic for a consulting group; and estimates on fisheries resources in such diverse areas as the Pacific Ocean and off the Azores in the Atlantic.

The expanded limits for fisheries zones throughout the world have increased the need for information on many aspects of the field. The improvement of small-scale fishing demands a whole range of expertise--stock management, vessel organization and maintenance, handling, processing, and marketing of fish, and training of local fishermen--and the need for information in these areas is especially acute. It is hoped that the Library can continue to meet the growing needs for background documentation in this field and that the services can expand with the opportunities.

Total Expenditures

Accumulative - \$60,974.89
Reporting Year - \$29,666.10

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

Narrative Description

There are many ongoing marine programs at URI. The Master's program in Resource Economics (marine concentration) continues to attract students. In addition, the Ph.D. program in that field has been reactivated and applications are now being accepted for admission in the fall of 1978.

The two-year Master of Arts in Marine Affairs has

attracted an increased number of graduate students in that curriculum and continues to enroll LDC nationals.

The Fisheries and Marine Technology program receives far more applications than it can accept.

New facilities for the study of closed system aquaculture have been constructed. Ongoing research in the field is being pursued there.

A new laboratory/classroom facility at the Narragansett Bay Campus is nearing completion. When finished it will provide much needed oceanography laboratory and classroom space, as well as offices for the Marine Advisory Service.

Requests for individualized fisheries training programs continue to be received, as reported elsewhere (Section IV.B. - Objective/Output No. 2 - Response Capability, and Table III). So far all requests have been met, including one for a special 22-month program to qualify a Western Samoan to be a Chief Fisheries Officer.

Targets for Reporting Year

The University will continue to make every effort to accept applications for regular or special training in fisheries and food science from both U.S. and foreign nationals, particularly those that relate to solving marine resource problems of the LDCs.

Accomplishments

Ponte Tavares from the University Institute of the Azores continued his doctoral program in food science.

Abdullah Salah Al-Haddah, from the Fisheries Division, Agriculture Department, Kuwait, completed his special program in fisheries and marine technology. He returned to become a fisheries management official in Kuwait. As noted previously, the University has already received another request from FAO to train a second Kuwaiti fisheries official.

As the reporting period came to a close, two Saudi Arabian students were en route to the U.S. to begin one semester of English language study before entering a graduate (M.S.) program in food science. They are two of some 80 Saudi students whose academic programs in food science will be developed through the ICMRD/CODOT. The students will attend universities across the country selected by ICMRD/CODOT faculty advisors.

The first Iranian graduate student in food science qualified for admission to URI for the fall semester, and the first member of the URI faculty was selected to go to Iran under the terms of a contract signed in August between the University of Rhode Island (contracting member of CODOT) and the Institute of Nutrition Sciences and Food Technology of Iran.

Foreign nationals continued to benefit from on-site training abroad as one result of the small-scale fisheries development projects being conducted under AID 211(d) Grant auspices. Because of unknown spin-offs, the total number in each country can only be estimated, as follows:

Costa Rica - 14 technicians, 6 professional personnel
El Salvador - 6 technicians, 3 professional personnel
Guatemala - 3 technicians, 2 professional personnel

The University of Rhode Island is still the only institution in the U.S. receiving funds from the Intergovernmental Oceanographic Commission in the form of scholarships for LDC nationals enrolled in the Marine Affairs Program. Those now receiving LOC aid are Renzo Follegati, Chile, and Simon Tache, Camerouns. Also in the program Vincent Adebolu, from Nigeria, receives financial support directly from his government and Ethnan Golley-Morgen, of Sierra Leone is funded by the Afro-American Foundation.

Other curricula at the University attract LDC students, including especially Ocean Engineering, Resource Economics, Oceanography, and Food Technology. These programs are not sponsored by ICMRD but are cited here because they illustrate the University's multidisciplinary and long-term commitment to international marine resource activity.

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

The grant purposes have been multiple in nature. First, there was a five year development phase during which the University undertook a number of research activities designed to expand its domestic marine resources expertise and experience to an international dimension. There was a one-year transition period during which such research was to be more focused, and in 1975 the purposes were directed towards the development of small-scale fisheries program in LDCs. As a corollary to the extension of its knowledge base, the University was to improve its technical assistance response capability and its capacity to provide information as requested on marine resources. Additionally, these efforts were expected to bring about new initiatives in the development of related course materials for use on campus and in LDC institutions.

The activities supported by the grant during the first two years of the concentrated focus on small-scale fisheries programs were aimed primarily at establishing a documented record of the available literature regarding small-scale fisheries in the LDCs. This activity revealed that there was a paucity of literature on this subject. A considerable volume of material is being generated by URI staff involved in the program. In addition, the University has responded to a substantial number of requests for technical assistance, the Azores feasibility study being a good example.

Response capability improved but staff assistance was hampered by lack of adequate space. The Director of ICMRD personally intervened to obtain agreement that space for the ICMRD Library would be provided in the newly-constructed wing of the main University Library. Additionally, new quarters for support staff were assigned providing additional space and privacy.

A new two-year Master of Marine Affairs program was initiated by the University; plans were laid for the reactivation of the Ph.D. program in Resource Economics; and offerings in aquaculture and fisheries science were added.

During the current and final two-year period, the strengths and weaknesses of the systems approach to small-scale fisheries program development are being severely tested. There is early evidence that the systems of data collection and analyses envisioned as adequate for stock assessment are, in part, inadequate and that much more time and effort will be needed to provide assurance that a model for stock assessment of tropical fish can be produced by modifications of existing models. In the food technology project, the scheduled employment of a Research Associate and the transfer of one of the Principal Investigators delayed the beginning of on-site, counterpart activities which included testing methods for assessing fish quality, improved (sanitary) handling, preservation and the analysis of problems related to the technology of fish food production. Progress is now being made toward the original schedule. A changed political situation in Costa Rica brought about a modification of the schedule for providing a framework for the economic evaluation of fisheries policy options, as well as the scheduled identification of institutions and decision-makers who initiate fisheries policy.

In Section III. 3. the problem of an unchanging political situation as a critical assumption is discussed. It is not simply a question of political stability, which is extremely important; rather it is a question of knowing what regional and national elections are scheduled during the course of the life of a project abroad and, if possible, to have some estimate of the effect of a change in political power. A group of counterparts may willingly, even enthusiastically, cooperate with project personnel but if they are replaced in a political turn-over, much of the work may have to be done over with a new group which may--or may not--be equally cooperative.

Requests for technical assistance were met, except in two instances. The magnitude of several of these requests (Azores, Iran, Saudi Arabia) was greater than has been the case in the past. The number of requests for technical information increased substantially and probably could not have been met as promptly and as effectively as they were had it not been for the dedication of the library staff and the new space which the University made available for this grant-supported activity at no expense to the grant. Library holdings have increased considerably now that there is adequate space for them. More individualized training program requests were received and were met even though some earlier programs were continuing, causing a bit of a strain on University space and personnel resources. The new Master of Marine Affairs program got off to an excellent start and the Ph.D. program in Resource Economics was approved for renewal in the fall of 1978.

In short, each grant-supported activity has helped achieve grant purposes in a number of ways. Based on the steadily increasing number of requests for technical information, and the magnitude of several of the requests for technical assistance, it would appear that the University is acquiring an enviable reputation among United States, international and LDC agencies for its willingness to try to help resolve marine resource problems. And that is the foundation on which the proposal for a Section 211(d) Grant was submitted almost ten years ago.

VI. OTHER RESOURCES FOR GRANT-RELATED ACTIVITIES

A. ICMRD Activities

A detailed account of ICMRD activities involving other than 211(d) Grant resources will be found under Section IV., B. - Objective/Output No. 2 - Response Capability, Non-Project Activities. It is believed that all of the activities described in that section may be characterized as grant-related because each involves a response capability and expertise which have been developed in large measure as a result of the 211(d) Grant.

Briefly, aside for funds from AID for the Azores Project and presumably for the Guinea-Bissau training project, resources for projects involving on-campus or overseas activities have (or will) come from an American foundation, the Republic of China and the UNDP.

B. CODOT Activities

In addition to serving as the Principal Investigator of the 211(d) Small-Scale Fisheries subproject "Underutilization of Food Technology Resulting in Losses of Available Food," Dr. C.O. Chichester serves as the Executive Chairman of the Consortium for the Development of Technology (CODOT).

Members of CODOT are:

University of Rhode Island, Contracting Member
Michigan State University
Washington State University
University of California, Davis
University of Wisconsin, Madison

CODOT is an integral part of the International Center for Marine Resource Development. The Director of ICMRD provides general supervision of CODOT activities within the University and the Assistant Director also serves as Executive Director of the CODOT Executive Office.

Saudi Arabia

On July 18, 1978, the University of Rhode Island, acting in behalf of the CODOT members, signed a sub-contract with the Midwest Research Institute for the period June 1, 1978, through May 31, 1979, in the amount of \$99,075, to train up to 29 Saudi Arabian students in food science to the M.S. and Ph.D. levels. The sub-contract, funded by the Government of Saudi Arabia through the U.S. Treasury, is the first of an anticipated five or more yearly contracts between MRI and CODOT to train up to 80 Saudi Arabian students. After receiving their degrees, these students are to occupy specified positions in the newly established Quality Control Directorate, Consumer Protection Department, Ministry of Commerce. This is one of a number of programs, budgeted at \$777 million, under the jurisdiction of the United States - Saudi Arabian Joint Economic Commission. The United States is represented by the U.S. Treasury, with which MRI has a contract to process purchases of scientific equipment and furnish food technicians until CODOT has trained Saudi Arabian students to take the place of the non-Saudi technicians.

Iran

On August 16, 1978, URI President Newman signed a contract in behalf of CODOT with Dr. H. Ghassemi, Director of the Institute of Nutrition Sciences and Food Technology, Tehran, at the Royal Iranian Embassy, Washington, D.C. The contract is effective as of July 1, 1978, for a period of three years and the estimated budget is \$1,527,000, all of which is funded by the Government of Iran.

Under the provisions of the contract CODOT will provide food scientists for long- and short-term assignments to assist the Institute in its efforts to improve food production and nutrition in Iran, raise the level of the food science curricula at the University of Iran with which

the Institute is affiliated (the Director of the Institute is also Dean of the University's Graduate School), and train Iranian students in M.S. and Ph.D. food science programs.

Chile

Negotiations between the Fundacion Chile (Santiago) and CODOT which began in March 1978 were still continuing with regard to final details in late August when it was agreed that the first consultant from URI should be sent at once to investigate the possibilities of pair trawling for Aquijilla. ICMRD/CODOT advanced the funds required to meet this urgent request. Subsequently an agreement was signed under which CODOT will respond to requests submitted by the Fundacion to locate experts in various food resource areas (such as fisheries) to resolve food production problems. The agreement between Fundacion Chile and CODOT will run a year and on a cost plus fee basis is estimated at about \$20,000 in non-federal funding.

This agreement is an excellent example of the role CODOT can play in the development of fisheries programs with a view to food production as an outgrowth of experience gained by ICMRD-associated faculty under the AID 211(d) Grant.

Peru

In a letter dated May 3, 1978, the Technical Manager of Certificaciones Pesqueras Del Peru (Fishery Certifications of Peru), a government-owned company, agreed to an ICMRD/CODOT proposal to provide specialists (including experts from FDA) to give short courses covering such subjects as: factors affecting the quality of shrimp, sardines, anchovies, mackerel, bonito and tuna, and hake, among others, from the time of catch to processing; good in-plant operations; standards of identity and quality; methods of inspection; laboratory methods in support of inspection (60% of subject matter); and fish food production problems--specifically fish products for human consumption.

The courses are to be financed by West Germany's Gesellschaft fur Organisation, Planung und Ausbildung (GOPA) in the amount of \$9,392. Arrangements for giving the first courses were completed in August. Funds were received in September and Dr. John Liston and an instructor from the University of Washington (a CODOT member university) and a fishery inspector and laboratory technician from FDA were scheduled to go to Peru in October to give the first courses.

This project has been described in some detail because it illustrates an unusual international effort involving a consortium of American universities utilizing U.S. Government agency personnel as well as academic faculty and technical personnel, to provide short courses relating to fisheries food products for a Peruvian Government agency, all funded by a West German organization. It should be noted here again that the 211(d) Grant to the University of Rhode Island in 1969, which permitted the establishment of ICMRD, provided the means for strengthening the University's commitment "to assist in resolving the marine resource problems of the LCDs," to cite one of the major purposes of the Grant to this University. This Peruvian project is a concrete example of the capability of the University to respond to a request from a country to help it resolve a marine resource food problem.

ICAITI - Central America

The Basic Ordering Agreement between the University, acting in behalf of CODOT, and the Instituto Centroamericano de Investigación y Tecnología Industrial (ICAITI), in the amount of \$10,300 was signed late in August 1977 for the purpose of providing technical services and assistance to ICAITI in its Program for Technology Transfer (PTT). The BOA became effective with the issuance of Task Order No. 1 on March 7, 1978, and a second was being negotiated at the close of the reporting period.

There is a real and fruitful linkage between the 211(d) subproject "Underutilization of Food Technology" and this BOA. Under the subproject ICMRD signed an Agreement with ICAITI to provide certain laboratory services related to the quality of fish. CODOT previously had a multi-year contract with ICAITI funded by the AID Regional Office in Guatemala City. In its need for assistance in locating and obtaining the services of experts in the U.S., ICAITI logically turned to CODOT and URI, which promptly responded.

C. General University Activities

The University has received substantial grants from or entered into contracts with various U.S. Government agencies for oceanographic and environmental research and some for fisheries training for government personnel. The URI Marine Advisory Service is funded to a considerable extent by Sea Grant (URI is a Sea Grant institution). Some grants and contracts with individual faculty (but always under the direction of the University's Coordinator of Research) relate to research in the use of fish for human consumption, including marine fisheries as well as aquaculture (closed circuit systems).

As indicated above and in Section IV., B - Response Capability, the University's membership in the Consortium for the Development of Technology (CODOT) provides additional opportunities to assist developing countries, primarily in the processing and preservation of fish food products to insure the highest possible level of nutrition.

Membership in CODOT also makes available the expertise of the four other member universities, each of which is active in fisheries in some form as well as being a leader in food science technology and/or nutrition.

This broad, cross-disciplinary marine effort provides a major resource of specialists in marine and fresh water fisheries and the production of food resulting from fisheries. Obviously, this contributes to the success of the 211(d) Grant effort at URI.

VII. UTILIZATION OF INSTITUTIONAL RESPONSE CAPABILITIES IN DEVELOPMENT PROGRAMS

A. Requests for Assistance

Please refer to Section IV., B. - Objective/Output No. 2 - Response Capabilities; Section IV., C. - Objective/Output No. 3 - Information Capacity; Section VI. - Other Resources for Grant-Related Activities; and to Table III-A for listings and descriptions of requests for assistance received by the University during the reporting year.

B. Other

1. Number of LDC Graduate Students and Countries of Origin

Of the approximately 225 foreign students attending the University of Rhode Island during the report period there were more than 174 students from LDCs, and of these 98 were pursuing graduate studies. In addition, throughout the year there were a number of other LDC students in non-degree programs designed to meet specific needs. It is not possible to give statistics on the number in specific marine programs since cross-disciplinary concentrations are common. Applications from LDC students for the coming year have increased in number.

2. Number of Visitors

Visitors to ICMRD included a Japanese scientist interested in rural development and aquaculture; a Portugese ocean biologist; two government officials from

Guinea-Bissau concerned with small-scale fisheries development and surveillance within the country's 200-mile limit to prevent unauthorized fishing by other nations; the head of the legal department of the Ecuadorian Fisheries Directorate, Ministry of Natural Resources; two Indonesian officials, one being the Director of Production, Directorate General of Fisheries, and the other a staff member of the latter organization; and several foreign students.

There were, of course, American visitors, including a professor from Auburn University and several from government and private industry.

In most instances, foreign visitors received a briefing about ICMRD projects, especially the 211(d) Grant Small-Scale Fisheries Development program. Arrangements were made for them to meet and be briefed by faculty who are experts in the fields in which they indicated an interest, and normally the Dean/Director hosted a luncheon for them at the Faculty Center. Foreign visitors to ICMRD are usually scheduled by contract visitor organizations, such as the Institute of International Education, by NOAA or FAO. They have a genuine interest in marine-related programs at the University, including those in fisheries training and food production.

Since there is no central visitor's registry at URI the total number of people visiting the University is unknown, but it is quite large. In addition to visits by individuals there are many conferences held on the campus during the year which attract substantial numbers of people. One, the Annual Meeting of the American Fisheries Society in August 1978 was attended by over 500 people. Smaller conferences, and an evening lecture series given by the Graduate School of Oceanography, also attracted a substantial number of visitors and served to indicate the diverse competencies of URI in the marine fields.

3. Known Use of Research, Teaching Materials, Methodologies

Materials produced under grant auspices are distributed by the ICMRD Library. During the year approximately 500 copies of Panamanian Small-Scale Fishermen: Society, Culture and Change were distributed as well as over 300 copies of other publications. Significant numbers of the State-of-the-Art papers prepared during the 1975-1977 grant period were requested. Since ICMRD publications are also made available through AID and are listed in its Catalogue of Research Literature for Development there is no doubt that research results reach a wide audience.

Research and methodologies are also utilized directly by graduate students who work on the projects and whose theses represent such involvement. In the Annual Report for 1976-1977 four such theses were recorded, and this year at least two more graduate students are working on theses which reflect their involvement in present projects. In Costa Rica, the resident Research Associate on the Food Technology sub-project (who is fluent in Spanish) is supervising the work of two Costa Rica students writing theses within her area of competence.

Drs. Pollnac and Poggie have both participated in conferences in Latin America dealing with the socio-cultural aspects of development which they have investigated for ICMRD. Four faculty members from URI (from the departments of anthropology, marine affairs, resource economics and oceanography) participated in a meeting at the Universidad de Concepcion, in Chile, and two other participants in ICMRD projects gave papers at the joint meeting of the Gulf and Caribbean Fisheries Institute and the Conference on Development of Small-Scale Fisheries in the Caribbean, held at Cartagena, Colombia, in November 1977.

The Principal Investigators and other staff members on the "Decision-Making Infrastructures for Artisan Fisheries Development" and the two economic projects "Economic Framework" and "Economic Information Systems," are working directly with Costa Rica officials in the preparation of the "Diagnostica," which is designed to assist the government in the planning of marine resource development in that country.

Reference has been made throughout this report to the numerous instances in which counterpart personnel are being trained by project participants. In fact, this might be regarded as one of the most important results of the program.

At the University teaching in the various marine disciplines continues and has been strengthened by the valuable field experience gained under grant auspices. A number of students from foreign nations have been attracted to the campus because of ICMRD's work and have enrolled in graduate or undergraduate programs or participated in specially-designed courses. Faculty members have also been asked to give papers or courses abroad and have responded to such requests whenever possible.

These examples of the utilization of institutional strengths are not intended to be comprehensive. They

are listed here to give some indication of the varied inputs grant activities have had both within and outside the University.

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

The marine specialities at URI have attracted numerous nationals from LDCs and their activities upon graduation have been detailed in previous reports. Not only do LDC nationals contribute to development work, however. A significant group of U.S. citizens who have been trained at URI have served or are now serving abroad. Among these are a graduate of the marine affairs program who is an AID Fisheries Officer in Dar es Salaam; an oceanographer working at the East-West Center on a marine regional program for Southeast Asia; the candidate for a Master's degree in aquaculture who was a member of the URI survey team for AID on Indonesia's fisheries; the former student in fisheries and marine technology now a Fishery Industry officer for FAO; a marine affairs student teaching fisheries management in Micronesia; and graduates of the resource economics program working for national and international agencies on development projects.

This list is, naturally, merely illustrative of the type of contribution URI graduates make in overseas development. There are many more working in the U.S. who directly or indirectly impact on strategies and techniques which are important to the developing world.

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 potential or indirect value to LDCs. A few representative examples of grants received by University personnel follow:

Saul Saila
Corporate Funding
"Assessment of Power-Plant-Induced Mortality
in Fish Populations"
\$2,565

Vito A. Nacci
U.S. Coast Guard
"A Field Experiment on Jettied In-Marine Anchors"
\$3,500

G. Ross Heath
Energy Research and Development Administration
"Seabed Disposal Geochemical and Sedimentological
Studies"
\$289,500

Spiros Constantinides
Department of Commerce
"Utilization of Mackerel"
\$105,150

Der-Hsiung Wang
Department of Commerce
"Demand Analysis for Northeast and Mid-Atlantic
Fish Products"
\$36,635

Niels Rorholm
Department of Commerce
"Climatological-Ocean Recreational Brochure"
\$2,600

Vito Nacci and William Kelly
Department of the Navy
"Undisturbed Surface Sediment Sampler"
\$28,984

Haraldur Sigurdsson and R. Sparks
National Science Foundation
"Tephrochronology of Submarine Volcanism in the
Lesser Antilles"
\$92,700

Scott Nixon and Michael Pilson
National Science Foundation
"Importance of Denitrification Nitrogen Fixation"
\$52,500

Frank Cuomo
Department of the Navy
"Low Frequency Directional Underwater Transducers
Research"
\$9,768

Robert Weisberg
National Science Foundation
"Observations of Equatorially Trapped Waves in
the Gulf of Guinea"
\$56,000

Betty Edel
Department of Commerce
National Sea Grant Depository
\$85,175

Hans Rossby
Department of Commerce
"A Profiling Current Meter"
\$111,000

Joel Dirlam and Der-Hsiung Wang
Department of Commerce
"Performance Study of Canadian Trade Practices/
Policies in Relation to Fisheries"
\$35,000

Robert Taber and Jeffrey Howe
National Marine Fisheries Service
"Demonstration of Offloading Materials Handling
Techniques for Southern New England"
\$25,200

Ralph Watts and David Evans
National Science Foundation
"Measurements of Wind Precipitation Deep Ocean
Monitoring Noise"
\$22,900

Neil Ross
General Funding
"Analysis of Aerial Photographs of Marinas in
Rhode Island"
\$2,469

Stephen Olsen
Department of Commerce
"Rhode Island Coastal Zone Management Program"
\$310,084

Theodore Smayda
National Science Foundation
"Cause of Phytoplankton Succession Blooms in
Narragansett Bay"
\$109,300

Neil Ross
Miscellaneous Funding Sources
"Literature Review of Marinas and Recreational
Boating"
\$4,281

Jean-Guy Schilling
National Science Foundation
"Geothermal Isotopic Variations in Mid-Ocean
Ridges and Origin"
\$115,000

G. Ross Heath
National Science Foundation
"Studies of Process Controlling Composition of
Deep-Sea Nodules"
\$114,700

Spiros Constantinides
Miscellaneous Sources
"Nutritional Evaluation of Southern New England
Marine Species"
\$9,000

Kenneth McConnell
Miscellaneous Sources
"Inventory and Survey of Marine Recreational
Fishing Vessels"
\$5,000

Malcolm Spaulding
Miscellaneous Sources
"Influence of Nuclear Power Plan on Entrain of
Fish Larvae"
\$22,680

Dana Kester
Department of Commerce
"Transition and Heavy Metal Chemistry Associated
with Deep Water 106"
\$103,756

Sheldon Pratt
Department of the Navy
"Monitoring Dredged Material Disposal Areas Used
for Fisheries"
\$3,994

Martin Hyman
Rhode Island Funds
"Lobster Larvae Sampling in Block Island Sound"
\$15,985

Yuzuru Shimizu
Department of Health, Education and Welfare
"Atlantic Shellfish Poison G. Tararensis Toxin"
\$50,300

Donald McCreight and John Sainsbury
AID
"Agriculture and Fisheries Development in the
Azores"
\$288,989

Kenneth McConnell
Department of Commerce
"Marine Recreational Fisheries Study in Long
Island"
\$49,375

Richard Wolke
Miscellaneous Funding Sources
"Light and Electron Microscopic Examination of
Fish Exposed (Specification)"
\$17,500

James Kennett
National Science Foundation
"Microraleontological Paleoenvironmental Studies
of Marine Sediments"
\$84,300

M. Ledbetter
National Science Foundation
"History of Bottom Current Scour in the Southern
Ocean"
\$55,400

Sheldon Pratt
Department of the Navy
"Monitoring Dredged Material Areas for Fisheries"
\$21,157

Neils Rorholm
Department of Commerce
"Sea Grant Funding"
\$1,310,000

D. Randolph Watts
National Science Foundation
"Dynamics of Gulf Stream Meanders"
\$50,000

Donald McCreight and John Sainsbury
Agency for International Development
"Project Development for the University Insti-
tute of the Azores Agriculture Fisheries
Extension Education"
\$586,925

Malcolm Spaulding

GGD

"Design Construction and Field Testing of
Articulated Spar Buoy"

\$19,850

Richard Wolke

Miscellaneous Sources of Funding

"Histopathology of Marine Fisheries Exposed to
Organic Contaminants"

\$12,035

Prentice Stout

National Science Foundation

"7th - 9th Grade Dissemination Program of Marine
Science Awareness"

\$14,821

Nelson Marshall

Agricultural Development Council

International Marine Resource Workshop

\$4,000

H. Perry Jeffries

Department of Commerce

"High Speed Processing of Zooplankton Samples
by Electronic Image"

\$30,000

Kenneth McConnell

Miscellaneous Sources

"Economic Study of Headboats in New England"

\$10,000

Mason Wilson, Jr.

Department of Energy

"Environmental Assessment of Treated vs. Untreated
Oil Spills"

\$495,000

Neils Rorholm

Department of Commerce

"Cooperative Development of Marine University
Resource Capability in Malaysia"

\$95,000

Tung-Ching Lee

National Science Foundation

"Nutritional Effects of Maillard Browning of
Food"

\$201,845

Harlan Lampe
Agency for International Development
"Assistance to Small-Scale Fisheries Production
in Indonesia"
\$65,168

John McAniff
Department of Commerce
"Underwater Fatalities"
\$30,675

C. Linkages

The following new linkages were established during the reporting year and should be added to the extensive list submitted in the 1976-1977 Annual Report and included in this report as Annex I.

University of Maine
University of Massachusetts
University of New Hampshire
University of Connecticut
Department of Agriculture, Graduate School
Department of the Treasury
Midwest Research Institute, Kansas City, MO

Chile

Universidad de Concepcion

Costa Rica

University of Costa Rica, San Ramon Campus
Universidad Nacional

Iran

Institute of Nutrition Science and Food Technology

Saudi Arabia

Quality Control Directorate, Ministry of Commerce

D. Plans for Utilization of Institutional Response

The Organization of Presidents of the Land-Grant Colleges in New England plans to submit a proposal for a small-scale fisheries development program in one or more LDCs under Title XII auspices. A task force was established, headed by Dr. Gerald A. Donovan, Director of ICMRD. The Task Force has been meeting at URI or at the University of Massachusetts, Boston, at regular intervals. Sub-task groups were established in the several fields related to small-scale fisheries,

corresponding to those in which URI is conducting its own 211(d) small-scale fisheries development projects.

The report of the Resources Development Associates of Los Altos, California, included the University of Rhode Island among the eight universities in the United States capable of performing and directing research in any of the program areas recommended by RDA. It is of interest to note that four of the eight universities are members of the Consortium for the Development of Technology (CODOT) of which URI is the contracting member.

URI also expects to be part of a food science and technology group that will seek to undertake Title XII projects in that activity.

A draft proposal is nearing completion and will be submitted under the Title XII university strengthening program. The Section 211(d) Grant has helped make URI a leader in the field of marine resources and food science, but there are still aspects of the University's international effort which need to be strengthened or expanded. The Section 211(d) Grant is now devoted almost exclusively to the small-scale fisheries program development and cannot be stretched to meet these other aspects of the University's international involvement. These include more preparation for overseas assignments, such as cultural orientation and language study; visiting scholars; faculty and student exchanges; release time for specifically designed international curricula (which has been developed); better arrangements for arriving international students, including non-degree trainees undertaking individualized courses; and more centralized substantive program support.

The University hopes to be able to utilize its institutional response to assist other countries, as it has Iran and Saudi Arabia. The fact that the U.S. Treasury first approached URI/CODOT to submit a proposal for the entire Quality Control Directorate Program in Saudi Arabia is indicative of the academic standing of the member universities. The same may properly be said of the approach made by the Director of the Institute of Nutrition Science and Food Technology of Iran. In these two instances, the development of academic programs for 80 - 100 students and the selection of the institution which students would attend to complete those programs, is of particular importance in considering the development of educational capabilities.

As of the end of the reporting year, there were no other contracts of the magnitude of those with Iran and Saudi Arabia (through Midwest Research Institute and the U.S. Treasury). However, negotiations regarding two small projects in Chile and Peru were nearing completion. These involved marine fish-

eries and food science advice, experts and courses. A similar project continues with ICAITI in Central America. A private foundation may fund a faculty-student exchange with universities in Costa Rica.

All of these are concrete examples of the past utilization of URI's response capability. It plans to continue to use that response capability in the future to the best advantage whenever there is an opportunity to do so.

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

All the projects described in detail under Section IV, Accomplishments, will be continued in the remaining period of the grant. As indicated in that section, the thrust of some of these activities will vary as a consequence of situations encountered in the countries where activities are sited or because of technical problems involved with project structure. Activities planned for each of these projects, and the anticipated expenditures, are given below.

Project No. 1 - Resource Assessment

Targets for Next Year

The following activities will be pursued during 1978-79:

September-December 1978 - Tag returns will continue to be collected by Costa Rican participants who will forward them to Rhode Island where Stevenson and Sharkey will work on the comparison of the tagging method vs. analysis of length-frequency data. At this time they will decide whether the success of the tag and recapture program warrants elaboration in the form of a handbook on the organization, operation and analysis of such a method in tropical waters.

January-May 1979 - Principal Investigator or his assistant will return to Costa Rica to supervise final activities under project. He will review activities with overseas counterpart assistants and respond to any questions that might have developed with respect to the program. Work on the final analysis of the tag and recapture program will continue as will the comparison of the two different estimation systems. Reports and field work will be written up. Preliminary analysis at this time should reveal value of this method as a means to determine yield model parameter and management of stocks for maximum sustainable yield.

May-August 1979 - Final work by Principal Investigators and assistant on documentation, including: (1) length-weight and fishing effort analysis; (2) the tag and recapture analysis; (3) comparison between the two methods; and

(possibly) the tag and recapture handbook.

Final evaluation of this activity will take place at several levels. The first level is professional-scientific, which will be documented in published reports.

The second level of evaluation involves an assessment of the results and methods with respect to their effectiveness in the environment in which they are generated and applied. The analysis will involve whether the technique was functional in the environment.

The third level of evaluation is the extent to which the results can be used in the management of the resources. This will be apparent beyond the period of the study.

Final report will be comparison of parameter reports and a how-to-do-it-manual for use in developing countries.

Expected cost - \$24,621

Project No. 2 - Sociocultural Correlates; Message Design

Targets for Next Year

January 1979 - Spaulding will go to Guatemala to initiate research with respect to the assessment of social-psychological variables associated with innovative behavior and the communication of innovations.

Spring 1979 - Poggie and Pollnac will conduct field research in Costa Rica and/or Guatemala for two months. Their work will involve: examination of past and ongoing innovative behavior and its relationship to community social structure and individual success; generation of baseline data concerning sociocultural variables linked to other major areas of the multidisciplinary project; determination of existing formal and informal communication networks with regard to various aspects of artisan fishing; assessment of social-psychological variables associated with innovative behavior and the communication of innovations; and further assessment of the value of the models and methodologies proposed in the sociocultural State-of-the-Art paper (Pollnac 1976).

Remainder of report period, 1979 - Conduct analysis of surveys and prepare reports.

In addition to the above, the follow-up study of Panamanian fishermen's cooperatives not completed in first year of project, will be pursued by Pollnac.

Expected cost - \$36,666

Project No. 3 - Food Technology Project

Targets for Next Year

Work pursued will consist of continuation and completion of studies as detailed in description of project. Research Assistant returns in December for consultation, presentation of seminar on progress being made, and for guidance on future activities. From January-August 1979, counterpart agencies and other regional agencies will be assisted in identifying and solving problems related to food technology of fishery products. Final report of project and various booklets on handling, preservation and processing of fish will be prepared.

Expected cost - \$51,571

Project No. 4 - Knowledge Transfer Methodology

No plans for future activity. This project was completed in 1977.

Project No. 5a - Economic Framework

Targets for Next Year

September-December 1978 - Model modification and re-testing.

November 1978-March 1979 - Assist in completion of "Diagnostica," involving data analysis and generating descriptive statistics that relate to general development of small-scale fisheries in Costa Rica. Work to be done in Costa Rica with data analysis on URI campus.

March-August 1979 - Write final reports and refine models.

Project No. 5b - Economic Information Subproject

Targets for Next Year

September 1978-January 1979 - Further analysis of field data by Sutinen.

November 1978 - Lampe to conduct follow-up research in each country and make suggestions on modifications.

February 1979 - Sutinen to consult with Costa Rican government officials on recommendations for an optimal information system for Costa Rican small-scale fisheries.

Spring-August 1979 - Report preparation.

Expected cost - \$134,535

Project No. 6 - Decision-Making Infrastructures

Targets for Next Year

Principal Investigator will return to Costa Rica in January or February 1979 for two purposes: (1) to participate in the completion of the "Diagnostica" and (2) to prepare an organizational analysis and recommendation concerning the governmental structure best suited to carry out the recommendations of the "Diagnostica." Both of these will be presented to the President of Costa Rica for action.

Activity for the remainder of the grant will focus on an analysis of the implementation of the fisheries' plan regarding the effectiveness of the recommended governmental structure in maximizing marine resource development. An evaluation of this structure will also be conducted to ascertain its potential utility for other developing countries.

Expected cost - \$13,282

IX. INVOLVEMENT OF MINORITY PERSONNEL AND WOMEN

Under the competent supervision of the University's Affirmative Action Officer--a woman--the URI maintained its policy of sustained effort to hire qualified minorities and women at all levels whether faculty, technical or clerical staff. This policy applies to international as well as domestic operations.

The Director's Administrative Secretary is a woman member of the black minority. The ICMRD Librarian and her assistant are women. The ICMRD Administrative Secretary is a woman. Her predecessor was an American Indian woman, and another American Indian woman served half-time as a clerk-typist. The Research Associate resident in Costa Rica, where she works on the food technology project, is a woman.

ICMRD will, of course, continue in its efforts to attract minority personnel and women. They have rendered invaluable service at home and abroad.

Table I

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

Reporting Period September 1, 1977 - August 31, 1978

Grant Objectives/Outputs	211(d) Expenditures				Non-211(d) Funding Amount*
	Review Period 9/1/77 - 8/31/78	Cumulative Total	Projected Next Year	Projected to End of Grant	
Objective/Output #1: Extended Knowledge Base					\$250,000 - 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.
Project #1	\$ 52,024.31	\$ 94,271.15	\$ 24,621	\$ 24,621	
2	20,935.23	61,036.93	36,666	36,666	
3	22,777.68	72,945.54	51,571	51,571	
4	5,530.01	29,237.91	-0-	-0-	
5	110,335.30	293,855.18	134,535	134,535	
6	<u>9,016.24</u>	<u>9,016.24</u>	<u>13,282</u>	<u>13,282</u>	
Subtotals	220,618.77	560,322.95	260,675	260,675	
Objective/Output #2: Response Capability	-	-	-	-	\$115,000 in salaries and overhead.
Objective/Output #3: Information Capacity	29,666.10	60,974.89	37,334	37,334	\$20,000 (est.) from training and other programs for Kuwait, Guinea-Bissau, Republic of China and Costa Rica.
Objective/Output #4: Education & Training Capability	-	-	-	-	
Director's Office	<u>38,122.62</u>	<u>122,845.94</u>	<u>50,639</u>	<u>50,639</u>	
Totals	\$288,407.49	\$714,143.78	\$348,648	\$348,648	*Total \$385,000

Table II - A

211(d) Expenditure Report

Actual and Projected Summary

Under Institutional Grant #AID/csd 2455

Reporting Period September 1, 1977 - August 31, 1978

	Expenditures to Date		Projected Expenditures	Totals
	Reporting Period	Cumulative Total	Final Year	
Personnel	\$144,808.31	\$1,003,661.06	\$224,006.00	\$1,227,667.06
Graduate Students	48,867.72	251,315.01	37,736.00	289,051.01
Travel	60,723.33	176,009.53	26,842.00	202,851.53
Other	34,008.13	230,365.91	60,064.49	290,430.40
Grand Total	\$288,407.49	\$1,661,351.51	\$348,648.49	\$2,010,000.00

Table II - B

211(d) Expenditure Report

Reporting Year Detail

Under Institutional Grant #AID/csd 2455

Reporting Period September 1, 1977 - August 31, 1978

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

Caurie, Matthew	100%	\$ 1,007.87 ¹
Hennessey, Timothy	20%	5,630.07
Hueth, Darrell	15%	3,222.03
Hussen, Ahmed	100%	4,014.51
Lampe, Harlan	54%	17,971.33 ²
Maxwell, Douglas	100%	4,340.00 ²
Nutley, Linda	100%	5,025.56 ²
Pollnac, Richard	50%	12,170.25
Sainsbury, John	33%	4,536.57
Seay, Edmund	16%	3,375.30 ¹
Spaulding, Irving	27.8%	5,193.77
Stevenson, David	100%	18,789.57
Sutinen, Jon	63%	<u>16,087.85</u>
		\$101,364.68

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

	<u>Management</u>	
Estes, Thomas	25%	\$ 8,710.53
Howland, Robert	10%	<u>1,355.70</u>
		\$ 10,066.23
	<u>Librarian</u>	
Alexander, Jacqueline	100%	\$ 16,316.08

¹ End of Assignment

² Beginning of Assignment

Table II - B (continued)

<u>Clerical</u>		
Hartman, Joan	33.3%	\$ 2,111.96
Neal, Anne	100%	10,617.17
Reckling, Regina	50%	<u>4,332.21</u>
		\$ 17,061.34

Other Non-Professionals

None

C. Fringe Benefits: As applicable for the above.

(Includes fringe benefit charges on student stipends.) \$ 15,172.75

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>
Davis, A.	USA	\$ 4,206.27
Donmoyer, C.	USA	528.46
Epler, B.	USA	2,792.26
Jhaveri, J.	India	501.27
Johnson, J.	USA	5,571.84
Kohlberg, W.	USA	4,799.00
Kazantzis, D.	Greece	3,716.12
Liu, C.	China	607.60
Logan, P.	USA	3,719.30
Medeiros, P.	USA	2,893.70
Ralph, W.	USA	3,526.26
Scheid, A.	USA	4,177.26
Shank, M.	USA	5,877.46
Sharkey, P.	USA	5,145.60
Yang, C.	China	<u>705.25</u>
		\$ 48,867.72

III. A. Consultants: Total number and total amount.

None

Table II - B (continued)

IV. <u>Travel</u> : Total number of trips and total amount.	
A. Domestic	\$ 2,887.79
B. Foreign	57,835.55
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	\$ 5,582.73
VII. <u>Publications</u> : Number and total amount.	\$ 1,806.25
VIII. <u>Other</u> (such as telephone, postage, computer):	Total Amount
Miscellaneous	\$ 4,447.43
Communications	\$ 2,160.56
Supplies	\$ 2,509.86

Table III - A

Requests for Assistance Received During Reporting Period September 1, 1977 to August 31, 1978

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. Assist the University Institute of the Azores to provide services in Agriculture, Fisheries and Education.	USAID and University Institute of the Azores	USAID and University Institute of the Azores (Portugal)	AID/Portugal (Loan)	\$586,925	3 MY + TRNG	UIA should be able to provide desired extension services by end of contract period--July 1980. Goodwill generated for U.S. and for URI among Azorean/Portuguese in Rhode Island.
2. Assist Universidad de Concepcion, Chile, conduct fisheries workshop.	Universidad de Concepcion, Chile	Universidad de Concepcion, Chile	Universidad de Concepcion, Chile	\$ 5,000 (est.)	25 MD	Linkage between URI and UC strengthened.
3. Cooperative programs in marine science, specifically fisheries and Law of the Sea.	University of Costa Rica	Vice President for Research, UCR	Not yet funded but anticipate private U.S. foundation will do so	\$ 5,000- \$ 25,000 p.a.	2 MY + Exchange of scholars & students	Linkage between URI and UCR already strengthened by this additional effort to assist.
4. Cooperation in fisheries training and research.	University of Cape Coast, Ghana	Vice Chancellor, UCC	Not yet funded	?	?	UCC advised URI will endeavor to meet request in Title XII program.
5. (a) Assist in development of small-scale fisheries program in Guinea-Bissau.	Government of Guinea-Bissau and USAID	Government of Guinea-Bissau and USAID officials	AID	\$ 2,000 (est.)	15 MD	AID project document prepared.

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Table III - A

A. Requests Attended (continued)

5. (b) Develop special fisheries training program for 20 Guinea-Bisseauans.	Government of Guinea-Bisseau and USAID	Government of Guinea-Bisseau and USAID officials	Not yet funded	\$ 75,000 (est.)	6 MY	Not yet activated.
6. Central American regional economic fisheries study.	No one as yet	Secretariat-- Center for Central American Economic Intergration	Not yet funded	?	?	Awaits initiation of Title XII program.
7. Individualized fisheries training program.	FAO--Kuwait	FAO--through NMFS, NOAA	FAO	Not yet funded	1 MY	Linkage between URI/FAO and Kuwait Government strengthened (second fisheries trainee).
8. Individualized fishing boat design training program.	Republic of China	Fisheries Div., Jt. Comm. on Rural Constr. Taipei	Republic of China	\$ 1,400	50 MD	Training program begins early 1979.
9. Use of fish waste as fertilizer-- inquiry.	Catholic Relief Services, Sudan	Program Director, Catholic Relief Services, Sudan	No Cost	None	1 MD	Procedure developed by Indians of New England described, as requested, with suggestion that more economical to process fish waste into feed for animals.
10. Individualized fisheries training program to prepare Samoan for position as Chief Fisheries Officer.	FAO-- Western Samoa	FAO	FAO	\$ 4,000	4 MY	Program runs to 1980.

Table III - B

Requests for Assistance Received During Reporting Period September 1, 1977 to August 31, 1978

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	
1. French-speaking food scientist to join an AID team going to Chad to assist in a fresh water fisheries problem.	--	AID	--	--	--	URI did not have a French-speaking food scientist on the staff. Team scheduled to depart before a candidate could be located elsewhere.
2. Simulation project.	--	FAO--Sri Lanka	--	--	--	URI did not have the required capability.

ANNEX I

Linkages

The following linkages were reported in the 1976-1977 Annual Report. They are repeated in this report for ready reference since linkages with a number of them vary in strength from month to month or year to year. New linkages are listed in Section VI., C.

National

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

International

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 - CITA (Centro de Investigaciones en Tecnologia de
Alimentos)
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
Tecnologia 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

ANNEX II

List of Publications

- Arias, Luis F., Gonzalo Bonilla, C.O. Chichester, Spiros M. Constantinides, and T-C. Lee. 1977. Evaluacion de calidad microbiologica en pesca artesanal, en la region de Puntarenas (Golfo de Nicoya) Costa Rica. Centro de Investigaciones en Tecnologia de Alimentos (CITA)/University of Rhode Island (ICMRD).
- Arias, Luis F., Gonzalo Bonilla, Sheryl de Cabrera, C.O. Chichester, S.M. Constantinides, T-C. Lee, Roberto de Leon, Linda J. Nutley, and Jose M. Ridelman. 1978. An investigation into the microbiological quality of fish in Guatemala and Costa Rica. International Center for Marine Resource Development/Instituto Centroamericano de Investigacion y Tecnologia Industrial (ICAITI)/Centro de Investigaciones en Tecnologia de Alimentos (CITA).
- de Cabrera, Sheryl, C.O. Chichester, S. Constantinides, T-C. Lee, R. de Leon, and J.M. Ridelman. 1978. Calidad microbiologica de pescado en venta en la ciudad de Guatemala. 1978. Instituto Centroamericano de Investigacion y Tecnologia Industrial (ICAITI)/International Center for Marine Resource Development (ICMRD).
- Lampe, Harlan. 1978. A brief summary of a retail market survey in the area of San Jose, Costa Rica. ICMRD, University of Rhode Island, Kingston, R.I.
- _____. 1978. A brief summary of the Guatemala consumer survey. ICMRD, University of Rhode Island, Kingston, R.I.
- _____. 1978. Demand analysis and its implications for fisheries development. Paper presented at the Thirtieth Annual Gulf and Caribbean Fisheries Institute and the Conference on Development of Small-Scale Fisheries in the Caribbean, Cartagena, Colombia, November 1977. Proc. Gulf and Carib. Fish. Inst. 30:174-180.
- Poggie, John, Jr. 1978. Deferred gratification as an adaptive characteristic for small-scale fishermen. Ethos 6(2):114-123 (Summer 1978).
- _____. 1978. Ritual adaptation to risk and development in ocean fisheries. Paper presented at the Society for Applied Anthropology Annual Meeting, Merida, Mexico, April 1978.
- Pollnac, Richard B. 1977. Illusion susceptibility and adaptation to the marine environment: is the carpentered world hypothesis seaworthy? J. of Cross-Cultural Psy. 8(4):425-434 (December 1977).

- _____. 1977. Investment orientations among small-scale fishermen in the Gulf of Nicoya, Costa Rica. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 19.
- _____, ed. 1977. Panamanian small-scale fishermen: society, culture, and change. University of Rhode Island, Kingston, R.I., Marine Technical Report 44.
- _____. 1977. Small-scale fishermen's perceptions of the occupation of fishing in the Gulf of Nicoya, Costa Rica. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 18.
- _____. 1978. Sociocultural aspects of technological and institutional change among small-scale fishermen. Paper presented at the International Symposium on Modernization in Fishing Industries and Communities, East Carolina University, Greenville, North Carolina, 27-29 April 1978. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 22.
- _____. 1978. Sociocultural factors influencing success of intermediate food technology programs. *Food Technology* 32(4):89-92 (April 1978).
- _____. 1978. Technological change and social organization among small-scale fishermen. Paper prepared for Seminar/Workshop on Investigation and Development of Marine Resources in the 8th Region of Chile, Universidad de Concepcion, Concepcion, Chile. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 21.
- _____. 1977. Variance in perceptions of fishing and farming among small-scale fishermen in the Gulf of Nicoya, Costa Rica. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 20.
- Robbins, M.C., R.B. Pollnac, and L.C. Robbins. 1978. Income periodicity and expectations of goal attainment among small-scale fishermen in the Gulf of Nicoya, Costa Rica. University of Rhode Island, Kingston, R.I., Anthropology Working Paper 23.
- Stevenson, D.K. 1977. Growth rate calculation for Micropogon altipinnis from length frequency data collected in the Gulf of Nicoya, Costa Rica. A preliminary report to illustrate analytical methods. University of Rhode Island, Kingston, R.I.
- _____. 1978. Management of a tropical fish pot fishery for maximum sustainable yield. Paper presented at the Thirtieth Annual Gulf and Caribbean Fisheries Institute and the Conference on Development of Small-Scale Fisheries in the Caribbean, Cartagena, Colombia, November 1977. *Proc. Gulf and Carib. Fish. Inst.* 30:95-115 (September 1978).

Sutinen, J.G. 1978. A review of economic survey methods for artisanal fisheries. Preliminary draft. A State-of-the-Art paper.