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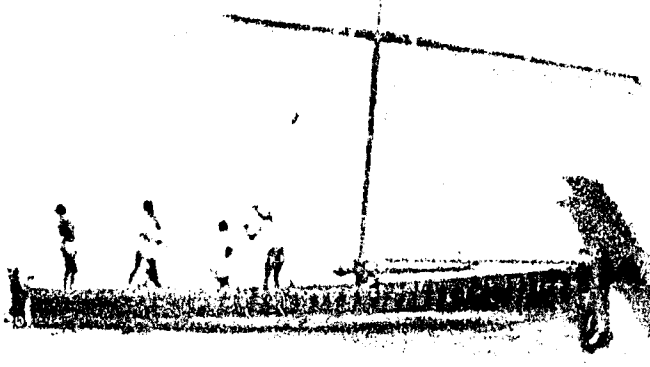
PROGRESS REPORT
July 1, 1982 - December 31, 1986
FISHERIES DEVELOPMENT
SUPPORT SERVICES
Donald E. McCreight
Program Director



ICMRD

INTERNATIONAL CENTER FOR MARINE RESOURCE DEVELOPMENT
126 WOODWARD HALL UNIVERSITY OF RHODE ISLAND
KINGSTON, RI 02881 USA

January 26, 1987

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PD-AAE-125

PROGRESS REPORT

July 1, 1982 - December 31, 1986

FISHERIES DEVELOPMENT
SUPPORT SERVICES

Donald E. McCreight
Program Director

Fisheries Development Support Services (FDSS) is a program of the Agency for International Development (AID), implemented by the International Center for Marine Resource Development (ICMRD) of the University of Rhode Island (URI) with collaborative support from the Office of Science of USAID. FDSS provides fisheries technical assistance, information services and training programs as well as applied research in fisheries development in the following areas: sociocultural factors, post harvest losses, resource utilization, management, and mariculture to developing countries.

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TO REQUEST ASSISTANCE

To request assistance or obtain more information about Fishery Development Support Services (DAN 4024 A-00 2072) ask your AID country Mission or write to:

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SUMMARY

Statistics

Title:	Fishery Development Support Services (FDSS)
Contractor:	University of Rhode Island (URI)
Implementer:	International Center for Marine Resource Development (ICMRD)
Program Director:	Donald E. McCreight (URI/ICMRD)
Program Officer:	Richard Neal (S&T/AGR/RNR)
Project Monitor:	Lamarr Trott (S&T/AGR/RNR)
Duration:	Phase I. 1 July 1982 - 30 June 1987 Phase II. 1 July 1987 - 30 June 1992
Reporting Period:	1 July 1982 - 31 December 1986
AID Funding:	Phase I. $1,575,000 Funding to date: $1,185,000

DESCRIPTIVE BACKGROUND

The "Fisheries Development Support Services" project was implemented in July, 1982 with the University of Rhode Island for a five year period. The project purpose was:

> to provide for the development and maintenance of a "Resource Center" at the recipient institution that will be a repository for skills and information in fishery development and management through the combination of applied research and practical experience; and to strengthen and expand the recipients institutional capacity to assist programs in developing countries aimed at improving the nutritional, employment and living conditions of the poor majority.

During the early years of the project, emphasis was placed primarily on three activities in accord with the program description of the Cooperative Agreement. These three areas of activity were:

1. a short-term advisory and consultant services
2. library and information services
3. long- and short-term training.

Development and maintenance of a capacity through applied research was not given high priority during early years of the project, as the AID project managers encouraged that attention be directed initially to the three activities identified above.

In an effort to better focus the program, at a mid-point in the project period AID requested that the University redesign its work plan to be more goal oriented, with defined objectives and outputs. Work was begun in this regard the beginning of the calendar year 1985. A consultant was hired with experience in management by objective and project design to assist in this process. The outcome was a division into five principle subject areas: 1. fisheries management, 2. socio-cultural factors, 3. use of mariculture, 4. postharvest fishery losses, and 5. resource utilization.

The four major objectives of the program are:

1. to provide technical assistance to AID and LDCs in problem identification, evaluation of opportunities, and planning and utilization of fisheries resources, especially in the subject area of socio-cultural factors, fisheries management, use of mariculture, postharvest losses, and resource utilization,

2. to provide library and information services for small scale fisheries development to LDCs,

3. to develop and provide long- and short-term degree and non-degree training in fisheries development to USAID LDC institutions and agencies,

4. to conduct applied research efforts and transfer of technology in the following areas of fisheries development:
   - fisheries management
   - socio-cultural factors
   - use of mariculture
   - postharvest fishing losses
   - resource utilization

The Cooperative Agreement provides for an umbrella organization to coordinate, plan and conduct fishery development activities. The plan called a for cost-sharing arrangement between the S&T-funded Cooperative Agreement and AID Missions, with the latter expected to cover travel and associated costs of experts supplied by the Center. Activities include publication and dissemination of information pertinent to funding development and training. The coordinating role also easily stretches to activities funded by developing countries, world banks, Peace Corps and development agencies in other countries.

Five priority areas have been identified by the program: socio-cultural factors, fisheries management, resource utilization, mariculture and the reduction of postharvest fishery losses. The program has a flexible structure which can incorporate new and eliminate lower priority areas as the need arises. The group is dedicated to its mission and is a ready source of expertise and capabilities for fishery development.

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ACCOMPLISHMENTS

Technical Assistance

With respect to technical assistance, over the past four years ICMRD has responded to requests from 15 USAID developing countries, one Regional USAID Bureau, and USAID S&T/RNR. These responses involved 1008 person days of TDY and 44 persons. Fishery development support services were provided in the areas of fishery management, resource utilization, sociocultural factors associated with development, fishing technology, mariculture, and post-harvest handling. Over the four year period the number of requests increased as the availability and quality of ICMRD's technical assistance became more broadly recognized.

Applied Research

Applied research projects in five areas of the fishery sciences have helped strengthen the working relationships of ICMRD with several developing countries and their institutions. Research on sociocultural factors has resulted in the accumulation of several large data sets, their partial analysis, and preparation of several reports. Completed reports include a comparative analysis of the role of women in fishing communities, an analysis of factors contributing to the success and failure of fishermen's cooperatives in Ecuador, the social and cultural characteristics of fishing communities, fishery development in West Africa, and traditional resource use rights and fishery management.

With respect to mariculture in developing countries, studies have focused on the use of artemia in aquaculture systems. This research has included the development of artemia production systems and quality control in both Ecuador and Thailand. Furthermore, ICMRD researchers have been invited by several international groups to present workshops and findings on their artemia studies. Work in postharvest fishery losses has demonstrated the need of workshops to train personnel in preservation and processing techniques. A training program of middle management people from the Phillipines has been run and an international workshop to formulate research guidelines in this area will be held at URI in April, 1987. A training manual to facilitate learning in this diverse area is near completion.

In the resource utilization area a research project has been initiated to evaluate species of Portunidae crabs in Ecuador in terms of species identification, geographical distribution, and catchability for the small-scale fishery. In-country training in the form of seminars have also been presented in the development of a research program utilizing Ecuadorian fishery scientists for several aspects of the project. Applied research in fisheries management have included studies of marine and freshwater capture and aquaculture fisheries in Guatemala and an assessment of domestic and foreign markets for the catch. In addition, a fishery development strategy paper was prepared for six African countries. Field research to collect data on Senegal's small pelagic fisheries has been done and is now being analyzed.

Training

The Cooperative Agreement has permitted ICMRD to establish a core training team capable of responding expeditiously to requests from LDCs for different types of training programs (non-degree, degree and study tours). An example of ICMRD's success is evidenced by the number of persons trained over the 1982-1986 period. A total of one hundred fifteen participants trained in the U.S. and an additional one hundred and thirty-five participants received in-country training. Participants represented sixteen different countries. ICMRD conducted twenty-nine non-degree training programs over the four and a half year period. Degree trainings averaged 32 students annually from AID countries (8 Ph.D.'s, 20 Master's and 4 Bachelor's).

ICMRD has served as a transfer agent for technology developed at the University by providing highly specialized training programs to participants from LDCs to ensure that the technology is properly modified for field application. ICMRD supplements its programs with an in-country training component. These efforts often result in the establishment of Memoranda of Understanding with associated universities or organizations (eight such agreements are in effect to date).

ICMRD's coordinating role has resulted in a unique capability to offer training in virtually all aspects of marine fisheries.

Information Services

In the past five years, the ICMRD Information Service has distributed annually 1300 - 1700 ICMRD documents to fisheries development personnel, not including the ICMRD Newsletter, or Briefs; distributed an average of 3000 pages per year of reference materials in response to subject requests; designed individual programs for librarians visiting the Information Service to research issues of fisheries information service development; regularly prepared information packages on target countries/issues for AID incountry projects; helped establish marine information networks in two AID countries (Costa Rica-1982 and Ecuador-1986). A database of fisheries documents has been developed. AID missions and others can receive either an IBM compatible disk or a printout of documents available from the Information Service.

UTILIZATION AND IMPACT

Use of Fisheries Development Support Services (FDSS), that is, the number of technical assistance consultations, the number of degree and non-degree participants, the number of in-country participants and training programs, publications (including working papers, newsletters, training manuals, journal articles, and the document collection), established linkages through Memorandums of Agreement with LDC institutions and agencies have intensified and accelerated over the four years of project operation.

In November, an outside review panel reviewed the Cooperative Agreement and made the following observations:

> "In general, the review panel is most pleased with performance in training and providing technical assistance. We are very much aware of the constraints placed on this project by short-falls in anticipated funding levels, both centrally and through USAID Mission buy-in agreements. In spite of these constraints which have limited the geographic range of project activities, we conclude that the project purpose is generally being met, especially after the project was modified and focused in the 1984 amendment. The team is satisfied that these two project components are experiencing effective management and task-oriented work. Relations between the USAID project managers and key personnel at the Center are close and productive and include most of the project-oriented personnel we met during the site visit."

> "The International Center for Marine Resource Development at the University of Rhode Island conducts an important program of training, assistance and applied research in marine resource development in less developed countries. The university has a unique combination of capabilities to advance this mission and is responsive to the needs and opportunities in fishery development. The components of training and technical assistance are organized into interdisciplinary programs tied to strong academic programs. The program is sensitive to human factors and the context for development within developing countries."

INTRODUCTION

"Fishery Development Support Services" is a cooperative agreement between USAID and the University of Rhode Island's International Center for Marine Resource Development. This agreement provides a unique capability in fishery development in developing countries through training, applied research, information services, and technical assistance.

Many developing countries can make significant increases in food production, export of products for international trade, and economic development through fuller and more efficient use of the living marine resources. Barriers to their development can often be overcome by transfer of existing technology and information, training and, in some cases, applied research. Fishery development is often neglected in a development plan, but can be an effective way to influence the economy of less developed countries. The rights of coastal states now extend 200 miles off shore and give many less developed countries significant responsibilities and access to major food resources. These countries often have new resources at their doorstep and can prevent the decline of existing resources with the aid of technical resources and information available in the United States.

The University of Rhode Island has put together with AID's help an ability to respond to the needs of less developed countries in the area of marine fisheries. Interdisciplinary programs incorporating resource economics, fishery biology, anthropology and food technology and marine science in general provide the base for this capability. Equally important, is the structure of the Center, the Library Services, and the experience in both academic and technical training available at the Kingston and Bay campuses.

The history of USAID and URI cooperation since 1969 has led to a growing ability to meet the needs for assistance in fishery management and development in less developed countries. The building blocks of the present program: training, technical assistance, information services and applied research are interacting components including faculty, staff and facilities of the university. The training component includes both formal degree programs at the undergraduate and graduate levels and an ability to provide specialized training programs for groups such as Peace Corps volunteers, fishermen, and fishery development specialists both at the University of Rhode Island and within country sites. The technical assistance portion draws on the interdisciplinary team from across the campus with a sensitivity to local conditions and situations. Assistance is provided in a range of levels from analysis of fisheries to design or repair of fishing gear. Technical assistance also includes an excellent library facility for providing information from a wide range of library sources through a microcomputer database, the products of which are made available at the request of less developed countries. The applied research capabilities are extremely broad and include fishery science, mariculture, anthropology, fishery resource economics, food technology, fishery gear design and testing and others.

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TECHNICAL ASSISTANCE

Providing technical assistance to developing countries, though a major objective of FDSS, has been necessarily slow. This is the component of FDSS activities which is perhaps underutilized. Technical assistance requests originate in LDC institutions or agencies and are channelled through USAID country Missions. The first task of FDSS was to create an awareness of the FDSS program and of the kinds of assistance available. This was done initially through a brochure and other information means to Missions. For the following reasons response was sporadic.

1. LDC institutions were unaware of the channels of approach, and the unique nature of FDSS - providing short-term technical assistance.

2. Some Missions hesitated to request in case they had to share costs.

3. Information of FDSS may only be reaching the heads of institutions and not the fishery scientists and development officers who are the ones confronted with practical problems.

4. In some instances missions deny requests from LDC institutions and agencies stating that it isn't in the FDSS.

Creating an awareness of the program is an important task. Considerable travel and time are required of the FDSS staff. To date in four years the following 21 USAID developing countries were visited or personal contacts established. (Table I)

TABLE I

COUNTRIES VISITED & CONTACTS ESTABLISHED

Visited		Contacts Established
	ASIA	
Philippines		People's Republic of China
Thailand		
Indonesia		
Sri Lanka		
	OCEANIA	
Fiji		
New Caledonia		
	MIDDLE EAST	
Oman		Morrocco
Portugal (Europe)		Tunisia
	AFRICA	
Senegal		
Mauratania		
Djibouti		
Sierra Leone		
	LATIN AMERICA	
Costa Rica		Mexico
Barbados		
Honduras		
Panama		
Guatemala		
Ecuador		

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TECHNICAL ASSISTANCE

In the past four years (1983-1986) ICMRD has responded to requests from 15 USAID developing countries, one regional USAID Bureau, and USAID S&T/RNR, involving 1008 person days of TDYs and 44 persons. Tables II & III and Figures 1 and 2 summarize these activities by year and region. Fishery development support services were provided in the areas of fishery management, resource utilization, sociocultural factors associated with development, fishing technology, mariculture, and post-harvest losses. Table II lists technical assistance by type and country for 1986. Many of the persons involved were from the University of Rhode Island, although a few were from other institutions when URI personnel were unavailable for the task.

The number of TDYs vary from year to year and from country to country, primarily because they are unsolicited. USAID country missions request only when they have an on-going or proposed fisheries development project. Host country institutions or agencies hesitate to request technical assistance for reasons stated earlier and consequently, in order to make this component of the Cooperative Agreement effective FDSS must continually create an awareness through:

- brochures
- publications
- letters
- slides and video presentations
- briefing of Mission Directors and Agricultural or Rural Development officers
- briefing sessions to developing country national institutions and agencies involved in fisheries development.

As can be seen in Table II and Figure 2, the number of technical assistance activities has increased each year over the four year period. This is a result of ICMRD's growing reputation in the area of fisheries development as well as the increased number of contacts our staff is making in developing countries. What follows is a summary of a representative sample of recent TDYs. These summaries will give an indication of the range of technical assistance activities ICMRD can provide to LDCs.

Information Services

At the request of the Escuela Superior Politecnica del Litoral (ESPOL), Guayaquil, Ecuador and the USAID Mission, Ecuador the ICMRD Marine Information Specialist spent 30 days TDY in Guayaquil providing technical assistance to the ESPOL Library. The ICMRD specialist reviewed all phases of ESPOL's Marine Information services including collection building and maintenance, cataloging, circulation, exchange agreements, and education and training in librarianship. On the basis of these reviews, the specialist made specific recommendations for implementing the Marine Information Service at ESPOL.

TABLE II
TECHNICAL ASSISTANCE ACTIVITIES OF FDSS SUMMARY OF 1983 - 1986

Country	1983		1984		1985		1986		Totals	
	TDYS	P/D	TDYS	P/D	TDYS	P/D	TDYS	P/D	TDYS	P/D
Costa Rica	1	14							1	14
Barbados			2	63					2	63
Djibouti	1	14							1	14
Ecuador					8	113	7	150	15	263
Fiji							1	30	1	30
Guatemala							1	30	1	30
Honduras	1	14							1	14
Indonesia					1	7	3	135	4	142
Oman							2	30	2	30
Panama			1	14					1	14
Philippines	1	30			1	14	2	14	4	58
Portugal (Azores)			1	14					1	14
Sierra Leone					2	60			2	60
Sri Lanka			2	56					2	56
Thailand							1	7	1	7
African Regional Bureau and S.T. AGR/RNR			2	67	3	132			5	199
TOTALS	4	72	8	214	15	326	17	396	44	1008

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TABLE III
1986 TECHNICAL ASSISTANCE IN DEVELOPING COUNTRIES

REGION AND DEVELOPING COUNTRY	PERSON MONTHS	AREA OF TECHNICAL ASSISTANCE	CONSULTANT OR URI FACULTY
Southeast Asia	5.25		
Indonesia	1.5	Fisheries Economics	Lampe/URI
	1.5	Fisheries Products and Marketing	McAllister
	1.5	Social Soundness	Pollnac/URI
Philippines	.25	US Training Follow-up Monitoring and Evaluation of Fisheries Projects	Pollnac/URI
	.25	Quality Artemia Production	Simpson/URI
Thailand	.25	Quality Artemia Production	Simpson/URI
Latin America	7.0		
Eucador	1.0	Fisheries Cooperative	Poggie/URI
	1.0	Crab Technology	DeAlteris/URI
	1.0	Crab Technology	Castro/URI
	1.0	Information Services	Beardsley/URI
	.50	Artemia Training Workshop	Bengston/URI
	.50	Fisheries Products Post Harvest Losses	Morrissey/URI
Guatemala	1.0	Fisheries Sector Study	Lampe/URI
South Pacific	1.0	Status of Fisheries Development	Helfrich
Near East	.50		
Oman	.50	Training Design and Selection of Participants	McCreight Aelion
TOTAL PERSON MONTHS OF ASSISTANCE	13.25		

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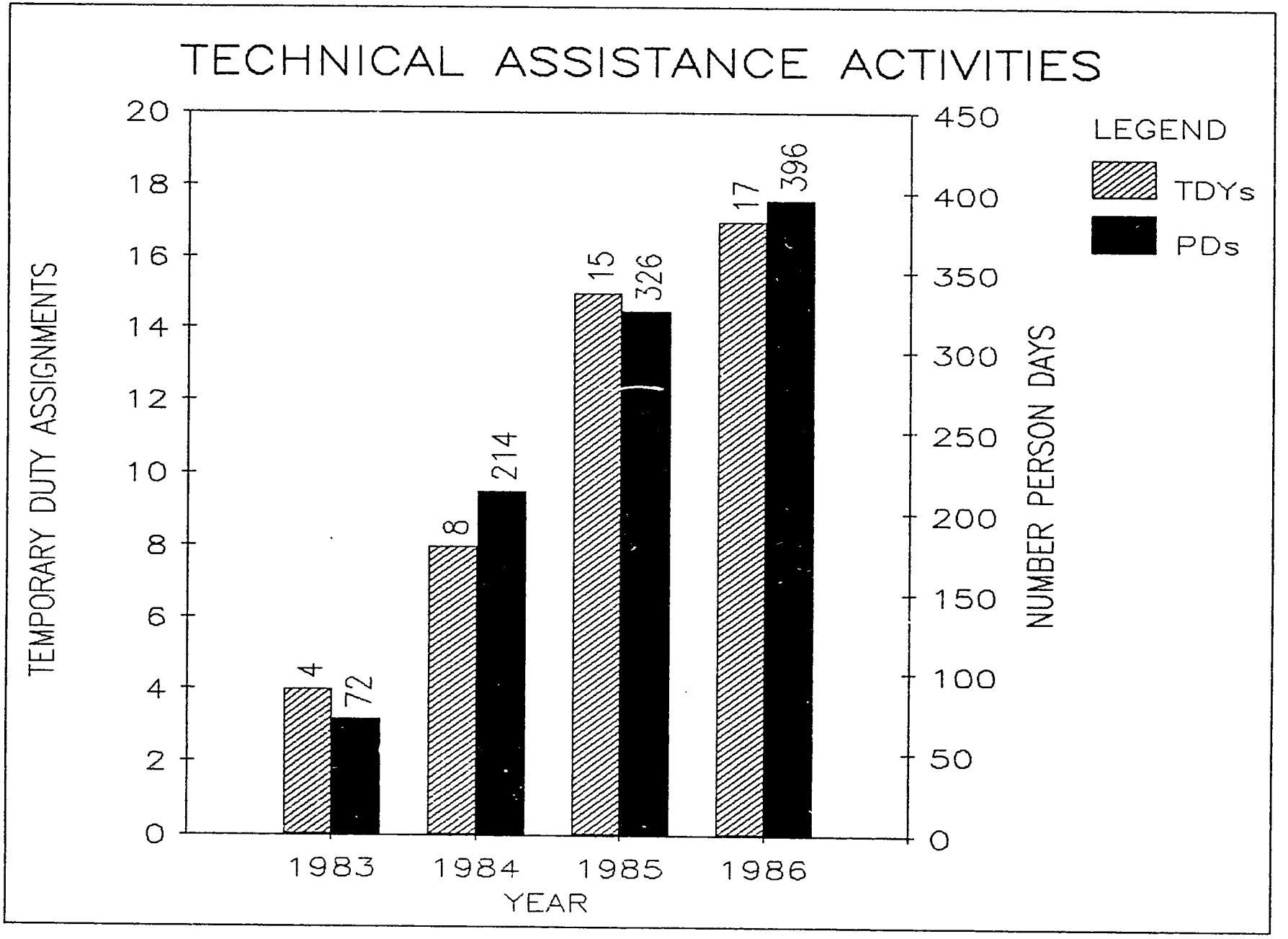

Figure 1 - Technical Assistance Activities

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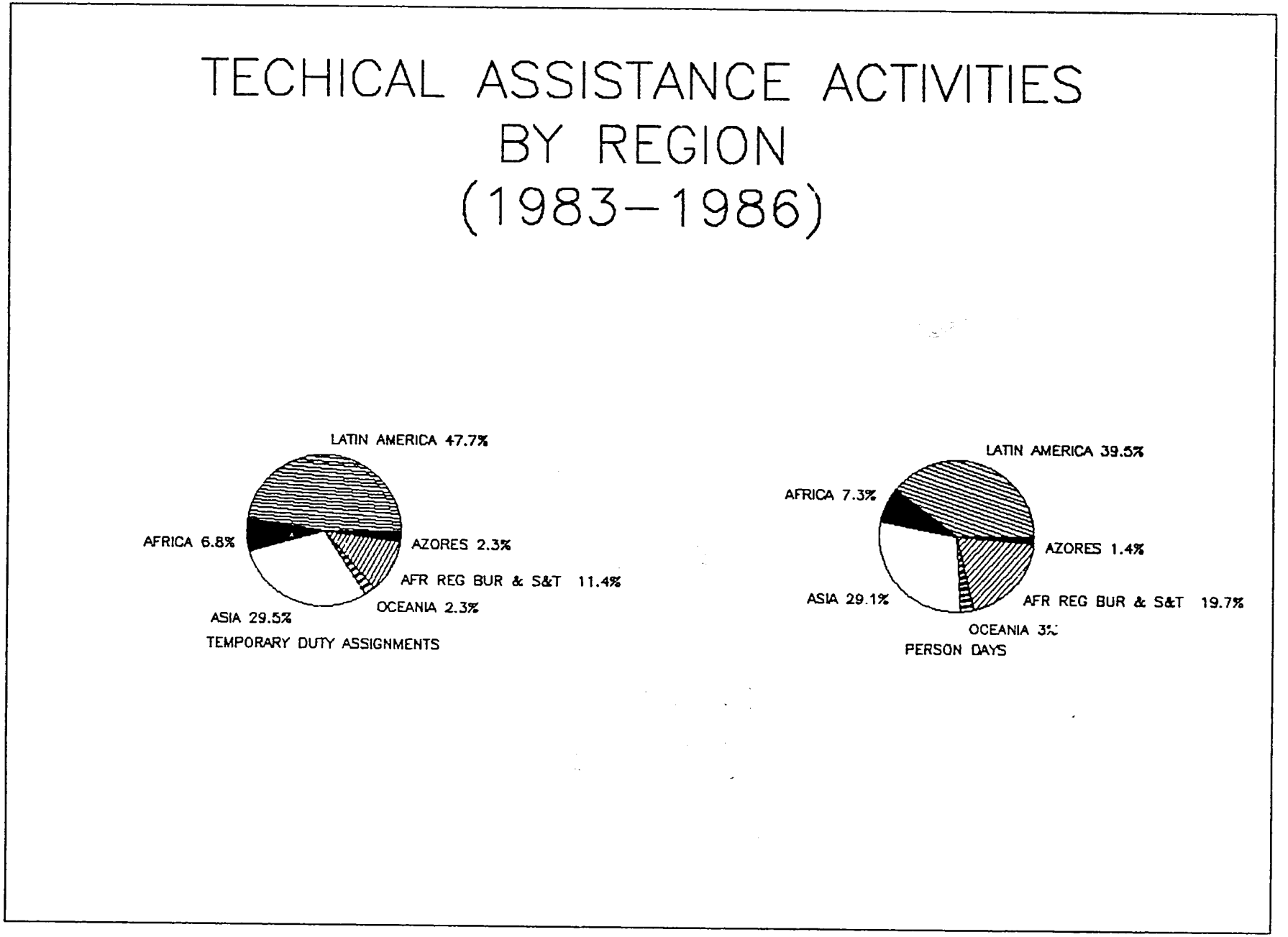

Figure 2 - Technical Assistance Activities by Region (1983-1986)

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Mariculture

In response to a request from USAID Sri Lanka and the Sri Lanka Ministry of Fisheries, ICMRD sent two consultants to Sri Lanka for three weeks in 1984 to assess the status of shrimp culture and provide recommendations concerning activities that could be undertaken to accelerate commercial production. The two specialists spent two days in Manila consulting with the Asian Development Bank, USAID, and the International Center for Living Aquatic Resource Management. They then went to Sri Lanka to assess the status of shrimp culture as it related to other commercial and environmental activities in the country. Their assessment resulted in a series of recommendations including the need for: 1. a larger training program in shrimp culture for technical personnel and farmers; 2. technical assistance to plan a project for improving design of fish culture training programs; 3. engineering technical assistance in pond siting and construction; 4. applied research support for shrimp farming; 5. development of brine shrimp (artemia) culture; and 6. a survey to select areas to be reserved for shrimp farms. Their report included details concerning all these recommendations.

Fishery Project Monitoring and Evaluation

In 1985 the Bureau of Fisheries and Aquatic Research (BFAR) made a request through USAID, Philippines for a consultant from ICMRD to provide follow-up on a fishery training project monitoring and evaluation program established by earlier ICMRD training activities. The consultant went to the Philippines for a period of two weeks and, in conjunction with BFAR personnel, reviewed the existing monitoring and evaluation procedures, made recommendations for minor changes, and conducted a post evaluation of two training projects carried out in Northern Luzon. The consultant worked with BFAR personnel to develop their skills in using the personal computer in the analysis of post-evaluation data and helped prepare the post-evaluation report.

Sociocultural Aspects of Project Development

At the request of USAID Indonesia, ICMRD sent a fisheries social scientist to Indonesia for six weeks in 1986 to conduct a social soundness analysis of a proposed fisheries development project. The project had freshwater aquaculture, mariculture, and marine fisheries components. The specialist consulted with USAID personnel in Jakarta and on Sumatra, Indonesian Fisheries personnel, university staff, and small scale producers in all potentially impacted areas.

The social soundness analysis focused on three levels of impact: 1. the institutions whose research capacity would be enhanced, 2. the producers who would benefit from increased incomes received from improved production techniques, and 3. the people of Indonesia who would have the opportunity to improve their nutrition through increased

availability of aquatic products and increased foreign exchange earned from high value export fishery products. Results of the interviews were included in a social soundness assessment included in the Indonesian Fisheries Development Project Paper prepared by USAID, Indonesia.

Fisheries Technology and Social Aspects

In 1985 USAID Ecuador and Escuela Superior Politecnica del Litoral (ESPOL) requested two specialists from ICMRD to assist their fisheries faculty in preparing research proposals to aid the small-scale fishermen. The specialists spent three weeks in Ecuador consulting with USAID personnel and ESPOL Faculty and visiting small-scale fishing communities along the coast to assess their needs. On the basis of this work the consultants and ESPOL faculty prepared three research proposals, one concerning development of appropriate fisheries technology, one to assess causes of success and failure of fishermen's cooperatives, and one concerning a country-wide baseline survey of fishing communities. The cooperative proposal was subsequently funded by the Consejo Nacional de Universidades Y Escuelas Politecnicas (CONUEP) of Ecuador. This resulted in two further TDYs based on requests from ESPOL and USAID Ecuador in 1986 during which an ICMRD social scientist helped design and carry out a detailed research plan which resulted in a survey of forty-eight fishermen's organizations and an analysis of factors contributing to the success of fishermen's cooperatives.

Fisheries Sector Studies

In 1986 USAID Guatemala requested a sector study of the country's marine and fresh water commercial fishery and aquaculture. Three specialists were sent by ICMRD and the International Center for Aquaculture, Auburn University during August and September 1986 to assess the potential, status, and development requirements of the fishery sector. The survey included: 1. a review of the status of marine and freshwater capture and aquaculture fisheries as well as laws pertaining to the sector and its development; 2. an inventory of important native and exotic fauna to determine their present and potential influence on capture fisheries and aquaculture; 3. an assessment of domestic and foreign markets for Guatemalan fishery products; and 4. an assessment of research efforts and needs as well as a determination of the status of the fishery sector support structure. This survey resulted in a detailed outline of the fishery development requirements as well as a strategy for advancing the growth of the fishery sector.

Postharvest Fishery Losses (Food Science)

In 1986 the Escuela Superior Politecnica del Litoral (ESPOL) requested through USAID Ecuador a food science specialist from ICMRD to determine needs in the area of postharvest losses in the fishery and present seminars on that topic at ESPOL. The specialist visited fish

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landing, processing, and marketing sites throughout Ecuador which resulted in development of research plans concerning post harvest losses in the fishery. As a result of these plans, ESPOL is planning, in conjunction with ICMRD, to run an in-country workshop on fishery postharvest losses.

Identification of Underutilized Species

In 1986 the Escuela Superior Politecnica del Litoral (ESPOL) and USAID Ecuador requested two specialists from ICMRD to evaluate species of Portunidae crabs in Ecuadorian waters in terms of species identification, geographical distribution, and catchability for the small-scale fishery. In addition the specialists were requested to identify and obtain further funding for the development of a project to stimulate the exploitation of this underutilized species. The specialists spent one month in Ecuador conducting a resource survey and determining the catchability of the species. They also presented a seminar at ESPOL related to their findings and recommendations. Several research proposals were prepared concerning further research on distribution of the species as well as an investigation of the export market. The proposals have received funding and further TDYs were in progress in January 1987.

Fishery Development Strategy

In 1985 the Bureau for Science and Technology, USAID, Washington D.C. requested that ICMRD provide a strategy paper for fisheries development in Africa. Three ICMRD specialists in resource economics and anthropology spent approximately one and one-half months reviewing published literature on African marine fisheries and prepared an overall assessment of the status of the sector. Based on the assessment six countries were selected on the basis of status of the fish stocks, relative need, and status as a USAID recipient country. A detailed assessment of the fishery sector along with a strategy for development was prepared for each country.

Mariculture of Artemia

In response to a request from the Faculty of Fisheries, Kasetsart University, Bangkok, Thailand through USAID Thailand, ICMRD sent a food scientist to consult on the quality of artemia cultured in salt ponds in Thailand. Outcome of the TDY was a proposal with the objectives of 1. analysis of the effect of environmental factors on salt ponds, 2. analysis of nutritional quality and pesticide residues of artemia raised in salt ponds, 3. determining the suitability of artemia as live food for larval stages of sea bass and shrimp, and 4. supporting the research of a Kasetsart University researcher who will determine the pond characteristics that lead to good algae production for improving quality of artemia raised.

APPLIED RESEARCH

The applied research areas for the fisheries cooperative agreement include: sociocultural aspects of small scale fisheries, the use of mariculture, postharvest fishery losses, resource utilization and fisheries management. Studies have included field research, in-country seminars and training, research at the University of Rhode Island by AID sponsored scientists from LDC countries, reports and application of results.

Sociocultural Factors

The research conducted under the section of sociocultural factors involved four specific areas: 1. analysis of the role of women in fishing communities, 2. analysis of the factors which influence the success of fishermen's cooperatives, 3. analysis of traditional behavior patterns in fishing communities, and 4. development of a model demonstrating the interrelationship between sociocultural aspects of a fishing community and problems in development and change.

Preliminary field work concerning women in fishing communities was conducted in Sierra Leone, West Africa, and a paper concerning the role of women in fishing communities was written based on an analysis of data from 180 societies. The paper compared the work patterns of women in fishing societies with those from other types of societies to determine the impact the occupation of fishing had on women's roles. A larger data set concerning women in fishing societies has been analyzed, and part of the results have been included in two other papers written concerning social and cultural aspects of fishing communities.

A relatively large data set on fishermen's cooperatives has been analyzed and used as a basis for the draft manual on fishermen's cooperatives. This analysis was also used to prepare a project for analysis of the factors contributing to the success and failure of fishermen's cooperatives in Ecuador. Data was collected concerning 48 Ecuadorian fishermen's cooperatives and an analysis of factors contributing to success and failure has been completed.

The analysis of traditional behavior patterns in fishing communities has thus far resulted in the compilation of several large data sets including sociocultural information from fishing societies around the world. These data sets have been partially analyzed, and the results have been presented at professional meetings and/or accepted for publication. The papers include "Peoples of the Sea and Coastal Zone: an Anthropological Perspective", "Social and Cultural Characteristics of Fishing Peoples", "Traditional Resource Use Rights and Fishery Management in LDCs", and "Sociocultural Issues in West African Fisheries Development."

The model for development and change in fishing communities examines the applied aspects of sociocultural characteristics of fishing communities. All papers prepared and analyses done for other subsections of sociocultural factors are presented in terms of their

applied significance; hence, research completed concerning roles of women, factors contributing to cooperative success, and sociocultural characteristics of fishing peoples is directly applicable to the construction of the model. In addition to the research referred to above, a large data set concerning fisheries development has been accumulated and will be analyzed to develop the model.

Mariculture

Research projects in the use of mariculture in developing countries include these areas: development of Artemia sp. production and quality control in Ecuador and Thailand, studies in Artemia sp. quality, and international aspects concerning the study of Artemia sp. It has been conclusively proven by our data that the fatty acid profile of Artemia sp. largely determines the condition of the predator, in this case the larval shrimp. Because of our research capabilities, we have been asked by various groups to analyze brine shrimp lots from commercial companies and recommend certain lots over others. This has been done in several hatcheries in Ecuador. Furthermore, we have trained ESPOL personnel in analytical methods and have helped in the procurement of equipment at URI. In-country training was done by Dr. David Bengston for shrimp hatchery technicians. His expenses were paid for by ESPOL. During the past year (1986) an exchange research scientist from Spain was working in our lab and helping to prepare a laboratory manual for Artemia sp.. In May of 1986 visits were made to both Thailand and the Philippines to consult about Artemia sp. production. Although it is not native to either country expanding aquaculture needs have spawned commercial production. Samples collected from Southeast Asia and analyzed at URI were found to be high quality Artemia sp. are being commercially produced, and in some cases, shipped overseas to countries having shrimp aquaculture facilities. In Thailand, contacts were made with the USAID Mission and several universities and groups. A faculty member of Kasetsart University is now in a training program at URI. Her research and training will deal with Artemia sp. and she will eventually return to Thailand to work on the question of how a pond can manage to yield superior Artemia sp. In the Philippines, a visit to the SEAFDEC facility was made and samples were tested at URI. The SEAFDEC facility is a fully integrated one where small livestock are raised for meat and used for feed for Artemia sp. and milkfish. The Artemia sp. samples proved to be of good quality. A memorandum of understanding was written between SEAFDEC and URI.

Ongoing research is utilizing the isoelectric focusing method to analyze proteins to determine the origin of Artemia sp. samples. Techniques have been perfected so that a single Artemia can be analyzed and its isoenzymes specially detected. Work is in progress on the encapsulation of food for the possible replacement of Artemia feeds.

International recognition of the Artemia sp. work is demonstrated by the agreement of the ISA (International Studies on Artemia) group to meet at URI June, 1987. A joint review paper has been published and sic papers will be published in the text of the 2nd International Conference on Artemia. Dr. Bengston has been appointed the U.S. editor for the

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three volume publication. Dr. Simpson has been invited to the People's Republic of China for October 1987 at the United Nations' expense for site visits of *Artemia sp.* production. Visits will also be made to the Philippines and Thailand during this trip. Dr. Simpson has also been invited to take part in an international *Artemia* training course in Belgium at the ISA expense.

Postharvest Fishery Losses

Postharvest fishery losses has been under new leadership since August, 1986. An international workshop of leading institutes (U.S. and foreign) that work in this field will be held at the Alton Jones Center in April, 1987 on the theme of reduction of postharvest fishery losses in lesser developed countries. The basic concept of the meeting is to draw upon the expertise of various scientists to present papers, which will be compiled and published, and to vigorously discuss what has been accomplished in past research, what is presently going on, and where we should direct the next decade in terms of continuing investigation in the area of postharvest fishery losses. There will be several attendees from developing nations to also present and discuss their needs and ideas.

Linkages have been made with Ecuador through ESPOL and INP, both of which are involved with postharvest fishery losses. Following an in-country visit, project proposals were written and are currently being reviewed for possible funding. A graduate student from ESPOL is currently studying for her Master's degree in Food Science and Nutrition at URI. Her research will concern the development of products from underutilized species. An in-country workshop has been organized through ESPOL and INP with regard to small-scale fisheries and ways to improve utilization of the harvest. This workshop, which has the participation of more than twenty Ecuadorian organizations, is scheduled for March 12 - 14, 1987.

The development of training workshops is an important aspect of postharvest fishery losses through the education of middle management personnel by training them in techniques to increase the utilization of the fish harvested in their waters. A workshop for trainees from the Philippines was held in 1985 at the URI campus. An additional training workshop for personnel from lesser developed countries is scheduled for July, 1987. A training manual on seafood preservation and processing is being prepared for the workshop. Future plans are being developed for having this type workshop in host countries where it would be more available to a wider audience at a lower cost. Linkages are being made with institutes in Ecuador, Philippines and Costa Rica to establish in-country training programs.

Resource Utilization

In the area of resource utilization, a project has begun in cooperation with ESPOL to evaluate species of Portunidae crabs in Ecuadorian waters in terms of species identification, geographical distribution, and catchability for the small-scale fishery. Five

species of Portunidae crabs were captured, with two species belonging to the genus. Callinectes. C. toxotes was the largest and most abundant species of the swimming crabs found in the area and shows the greatest potential for the development of a new fishery. C. arcuatus, a slightly smaller crab, also has good potential to be a resource for both artisanal and commercial fishing industries. The ICMRD research specialists presented seminars at ESPOL related to their findings and recommendations. Several research proposals were prepared concerning further research on distribution of the species as well as an investigation of the export market. The proposals have received funding and investigations are in progress.

Resource Management

In resource management an on-going study is being done in relation to the management of the Senegalese pelagic fisheries. The fishery was chosen for two reasons. First, its long-term importance, accounting for more than half of total fish landings. Second, some indications that biological and economical overfishing are occurring in some areas of the country.

For the Senegal project, a bioeconomic model has been developed using the DYNAMO program which compiles and executes continuous simulation models. Conservation abilities, economic performance, political feasibility, monitoring and enforcement constraints, informational needs, and equity considerations were analyzed and their application for the Senegalese pelagic fishery are being stuided. Some of the management tools derived from the analyzed results have been tested in the model system. Through this system, policy implications were developed and some recommendations have been made.

PARTICIPANT TRAINING

The University of Rhode Island provides to qualified participants from developing countries either degree or non-degree training related to marine fisheries. ICMRD helps developing nations plan and implement training programs for their fisheries personnel. Courses of study may be formal, degree-granting programs or special specific experiences for an individual or group. Emphasis is placed upon the individual student's needs and designs the training program to address issues of concern to the host country. Trainings are conducted at the University of Rhode Island and affiliated institutions as well as in the host country. The duration of the training can very from a week to years.

ICMRD training goals are directed towards meeting three primary objectives:

1. To demonstrate an in-house capability to respond expeditiously to requests for:

   a. specialized non-degree training
   b. degree training
   c. study tours

2. To demonstrate a capability to provide follow-up support in the form of in-country training for all programs conducted at URI.

The Cooperative Agreement has permitted ICMRD to establish a core training team capable of responding expeditiously to requests from LDCs for different types of training programs (non-degree, degree and study tours). An example of ICMRD's success is evidenced by the number of persons trained over the 1982-1986 period. A total of one hundred fifteen participants trained in the U.S. and an additional one hundred and thirty-five participants received in-country training. (Figure 3) Participants represented sixteen different countries. The types of training offered include:

1. applied technology
2. fisheries science
3. fisheries project monitoring and evaluation
4. commercial fisheries development and extension
5. fisheries management
6. naval engineering
7. fisheries economics
8. stock assessment
9. fisheries project development and management
10. oceanographic instrumentation repair and maintenance
11. preservation and processing of fishery products
12. marine mechanical engineering and fisheries marine technology
13. marine diesel mechanics, welding and hydraulic systems (auxiliary marine systems)

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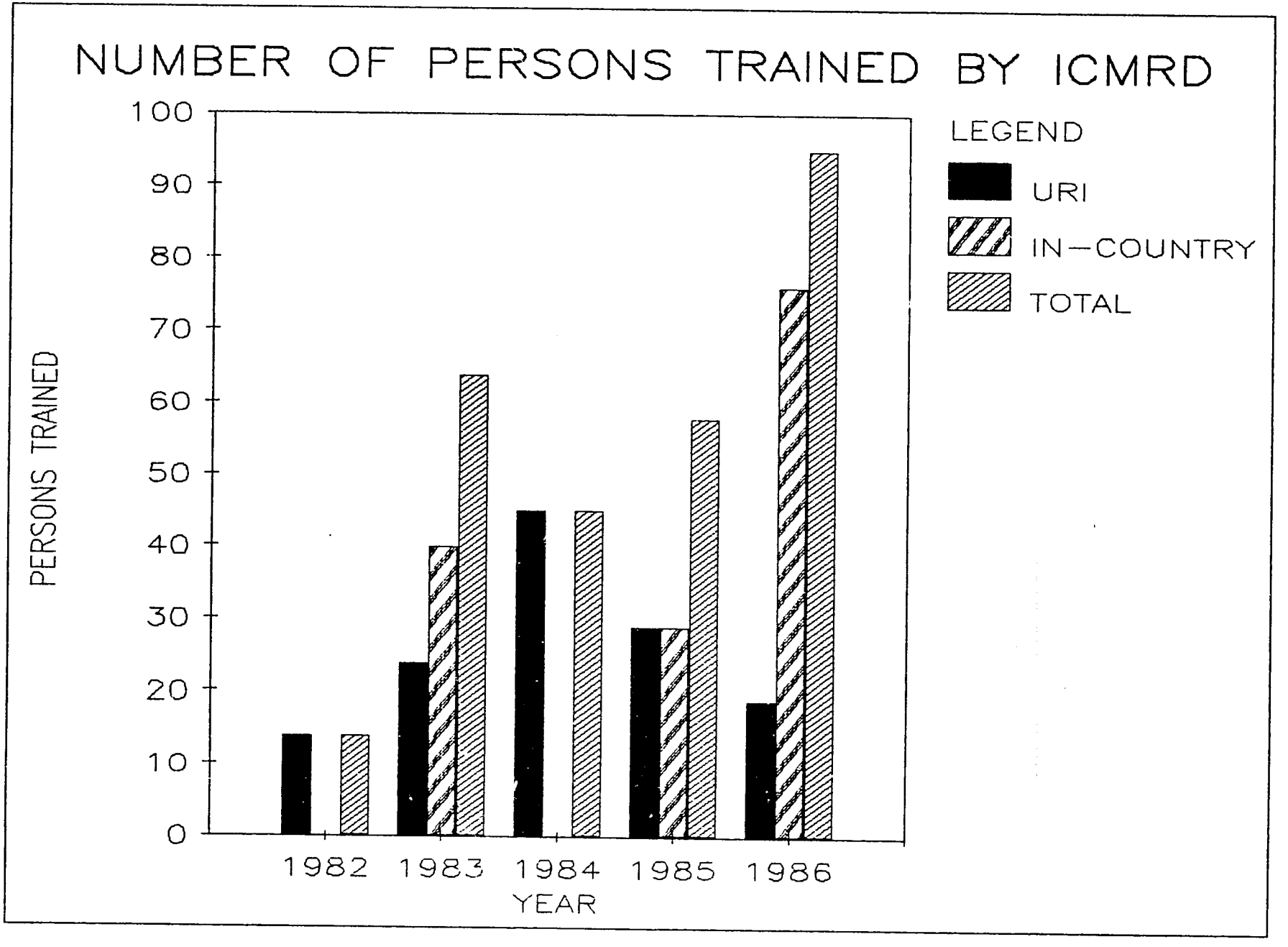

Figure 3 - Number of Persons Trained by ICMRD

ICMRD conducted twenty-nine, non-degree training programs over the four and a half year period (Table IV). Degree trainings over the past three years (Figure 4) averaged 32 students annually from AID countries (28 Ph.D.'s, 20 Master's and 4 Bachelor's).

The University of Rhode Island's commitment to maintaining its status as a leader in the field of marine science and technology resulted in a highly proficient cadre of instructors. ICMRD has served as a transfer agent for technology developed at the University by providing highly specialized training programs to participants from LDCs to ensure that the technology is properly modified for field application. ICMRD supplements its programs with an in-country training component. These efforts often result in the establishment of Memoranda of Understanding with associated universities or organizations (eight such agreements are in effect to date).

Degree Training

The University of Rhode Island has developed a worldwide reputation in research and education in fisheries and marine related programs. The International Center for Marine Resource Development has been instrumental in advertising this capability and actively disseminating information on fisheries and marine related degree programs from the following departments:

- Geography and Marine Affairs
- Oceanography
- Fisheries, Aquaculture and Pathology
- Resource Economics
- Food Science and Nutrition
- Natural Resources

The listing below demonstrates the depth of fisheries degree programs available within these departments.

- Fisheries Biology, M.S. in Fisheries Science and Technology, or M.S. or Ph.D. in Oceanography
- Fisheries Technology, B.S. in Fisheries Technology, or M.M.A. (Master of Marine Affairs) with Certificate in Commercial Fisheries
- Aquaculture and Mariculture, B.S. in Aquaculture Technology, or M.S. in Aquaculture, of M.S. and Ph.D. in Zoology, or M.S. and Ph.D. in Botany, or M.S. and Ph.D. in Ocean Engineering
- Management, M.M.A. in Marine Affairs, one year, or M.A. in Marine Affairs, two years, of M.M.A. with Certificate in Commercial Fisheries
- Fisheries Economics, B.S. in Resource Economics, or M.S. and Ph.D. in Resource Economics
- Sociocultural, M.M.A. with Certificate in Fisheries, or M.S. in Fisheries Science with Certificate in Extension
- Development, a certificate in International Development Studies can be taken concurrently with masters programs
- Administration, M.P.A. (Masters of Public Administration) in Political Science with Certificate in International Development Studies

Table IV

TRAINING PROGRAMS AT URI
AND AFFILIATED INSTITUTIONS IN THE U.S.
1982-1986

Subject & Training Location	Origin of the Participants	Dates of Training	Numbers of Participants
Naval Engineering (URI)	Ecuador	5/86	2
Culture of Food Organisms for Paneid Shrimps (URI)	Ecuador	10/86	1
Lipidology and Pesticide Research w/Artemia (URI)	Ecuador	8/86-9/86	1
Fishery Science and Technology (URI)	Sultanate of Oman	5/1986-88	11
Fisheries Management (URI)	Nigeria	1/82-1/83	1
Small-Scale Marine Fisheries Development & Extension (UPR)	U.S. Peace Corps Destination: Tunisia, Sierra Leone Morocco, Papua, New Guinea	7/83-9/83	19
Small Scale Marine Community Fisheries Development & Extension (UPR)	U.S. Peace Corps Destination: Morocco,	7/84-9/84	7
	Turks & Caicos	1/84-2/84	15
Small Scale Marine Community Fisheries Development & Extension (UPR)	U.S. Peace Corps Destination: Turks & Caicos, Dominican Republic, Jamaica, Tonga, Haiti Sierra Leone	7/85-9/85	18
Commercial Fisheries Development & Extension (URI)	U.S. Peace Corps Destination: Tunisia	7/86	3
Fisheries Economics (URI)	Indonesia	9/82-5/84	3
Fisheries Project Monitoring & Evaluation (URI)	Philippines	6/82-7/82	8
Marine Mechanical Engineering & Fisheries Marine Technology	Sri Lanka	6/83-6/84	1

TABLE IV (Cont'd)

TRAINING PROGRAMS AT URI
AND AFFILIATED INSTUTIONS IN THE U.S.
1982-1986

Subject & Training Location	Origin of the Participants	Dates of Training	Numbers of Participants
Stock Assessment (URI)	Philippines	11/84-2/85	2
Freshwater Shrimp Culture & Production Techniques	Spain	1/84-3/84	1
Fisheries Project Monitoring and Evaluation	Philippines	11/84-2/85	3
Fisheries Project Development and Management (URI)	Philippines	11/84-2/85	3
Preservation & Packaging of Fishery Products (URI)	Philippines	2/84	10
Oceanographic Instrumentation Repair and Maintenance (URI)	Philippines	8/85	2
Marine Sciences & Fisheries Information Services (URI)	Philippines	10/85	1
Oceanography & Fisheries Science	Philippines	9/86-12/86	1
HPLC Analysis of Carotenoids		8/81-8/82	1
Artemia & Advanced Analytical Instrumentation	Philippines	7/81-7/82	1

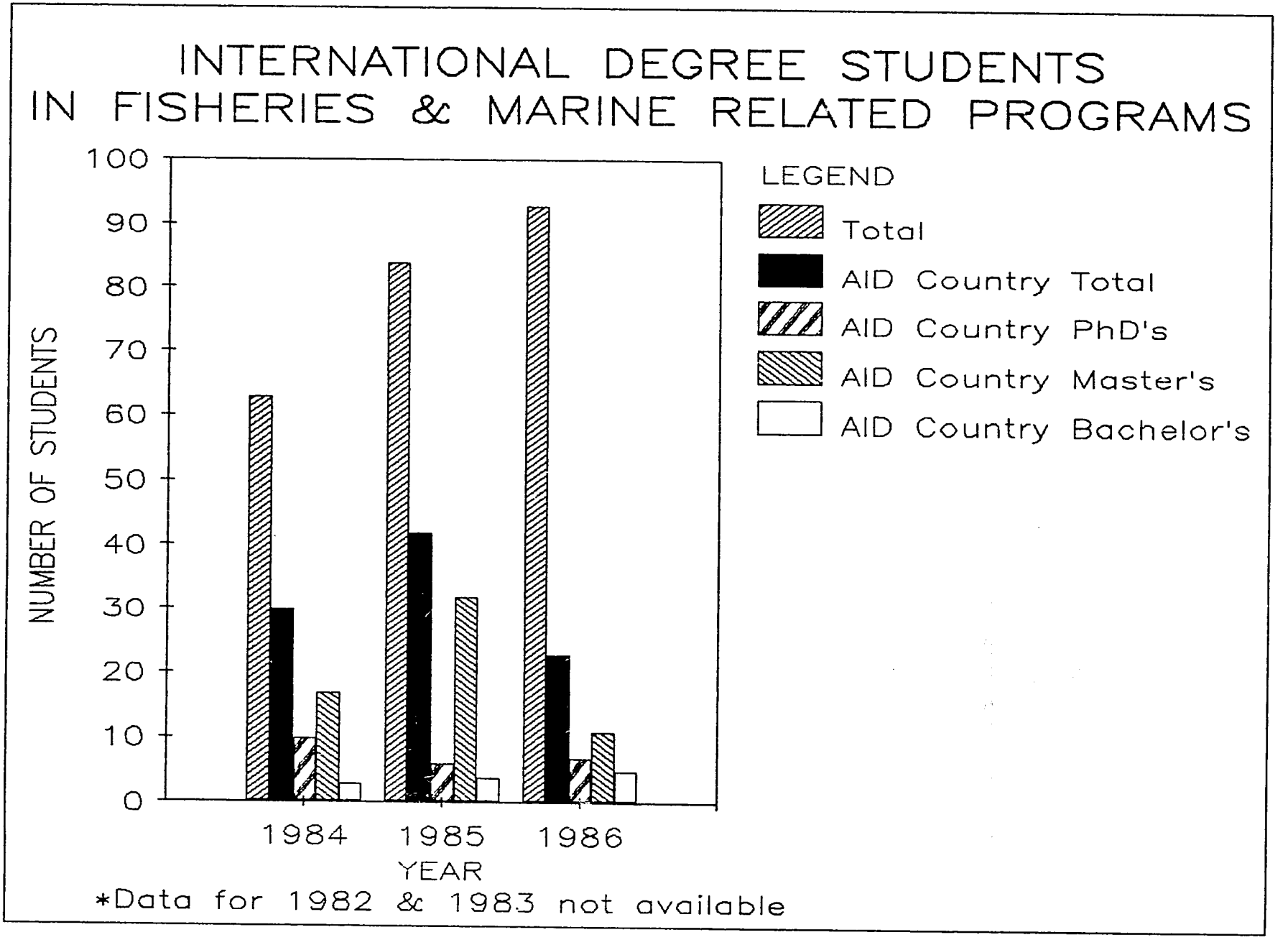

Figure 4 - International Degree Students in Fisheries & Marine Related Programs

- Fisheries Extension, M.M.A. with Certificate in Fisheries, or M.S. in Fisheries Science with Certificate in Extension
- Food Technology and Fisheries Products, M.S. and Ph.D. in Food Science and Technology, or B.S. in Food Technology.

The number of international degree seeking students enrolled in these departments has been growing rapidly (Figures 5 & 6). Their presence enhances the international character of the academic and student community on the campus. ICMRD supports the International Fisheries Association (IFA), a student organization which fosters communication between the international and American student body with a common interest in fisheries. IFA sponsors a seminar series, round table discussions, informal pot luck suppers and fishing trips. These informal activities contribute an international flavor and an interdisciplinary approach to the educational experience.

Non Degree Training

A principle .omponent of ICMRDs comprehensive approach to providing development assistance in fisheries is through an active training department. Training programs are conducted in the U.S. at the University of Rhode Island, and an affiliated institution, the University of Puerto Rico. URI faculty have also conducted in-country workshops in order to reach a broader audience of people that do not have the opportunity to attend trainings in the U.S. There has been a general trend towards an increase not only in the number of persons trained but in the total number of person months of training activities (Figure 7).

History of Training at the University of Rhode Island

There have been a total of one hundred and fifteen persons trained in the U.S. by ICMRD from the period of 1982 - 1986 (Figure 3). The course content and duration of the trainings has varied considerably depending on the participants needs (Table IV). All of these programs have been developed as a response from requests received by ICMRD for training. A brief summary of some of these programs is provided below in order to give an idea of the size, duration and types of diverse training programs that have been offered. It demonstrates the versatility and flexibility of ICMRD's training service.

1981-Present. Peace Corps Training in Marine Fisheries. This comprehensive training program is conducted annually. The initial program was conducted at URI and involved preparing eleven volunteers for marine fisheries assignments in Papua New Guinea and the Philippines. It now includes training for all countries involved in Peace Corps fisheries programs. The training includes boat building, small engine repair (diesel and gasoline), sailmaking, net making, knots, boat handling, navigation, electronics, fishing techniques, mariculture, cooperatives, extension and cross-cultural training. The program has a duration of eight weeks and is carried out in conjunction with the University of Puerto Rico at the Marine Science Center on Magueyes Island. ICMRD has trained a total of 72 volunteers.

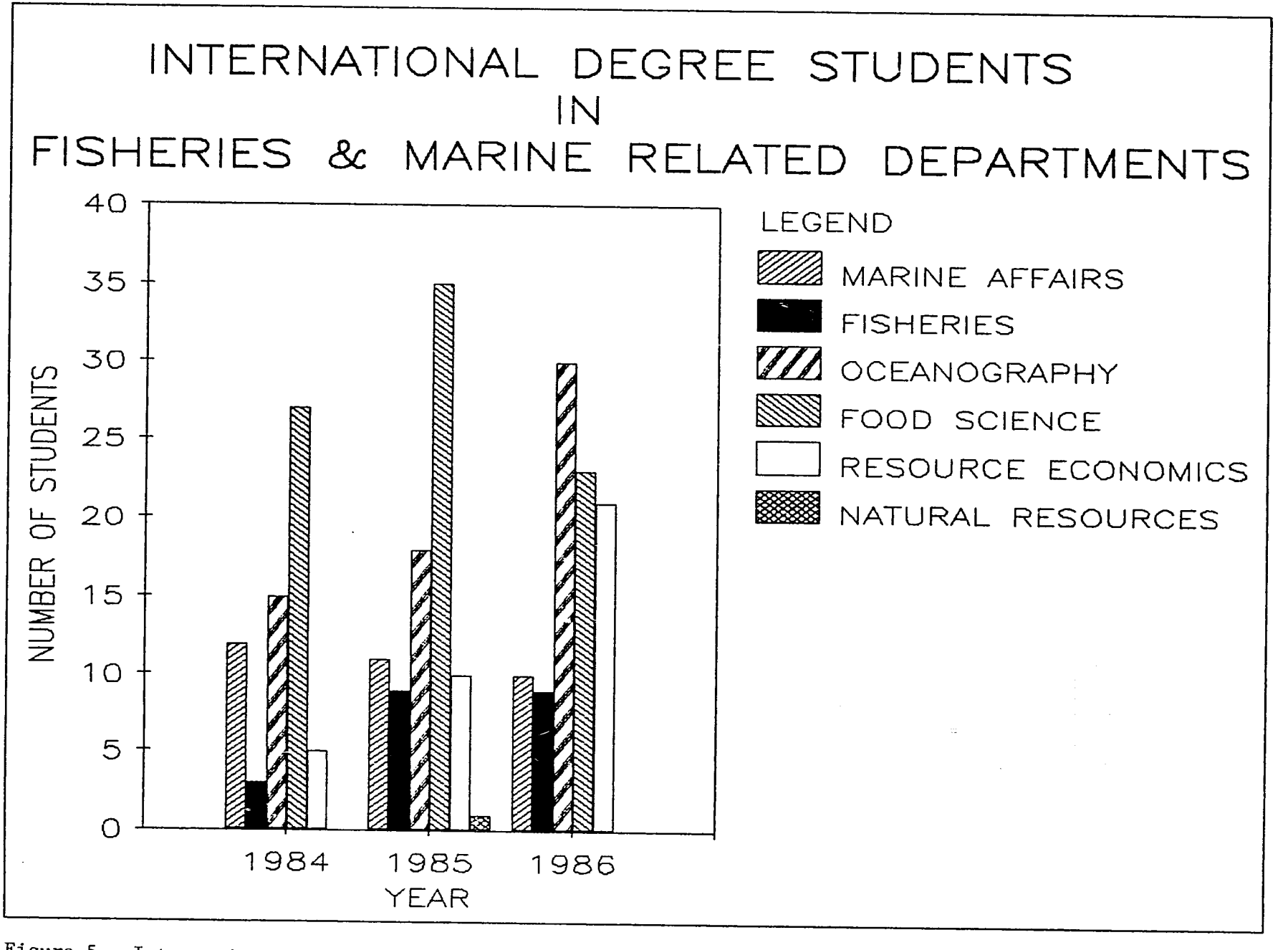

Figure 5 - International Degree Students in Fisheries & Marine Related Departments

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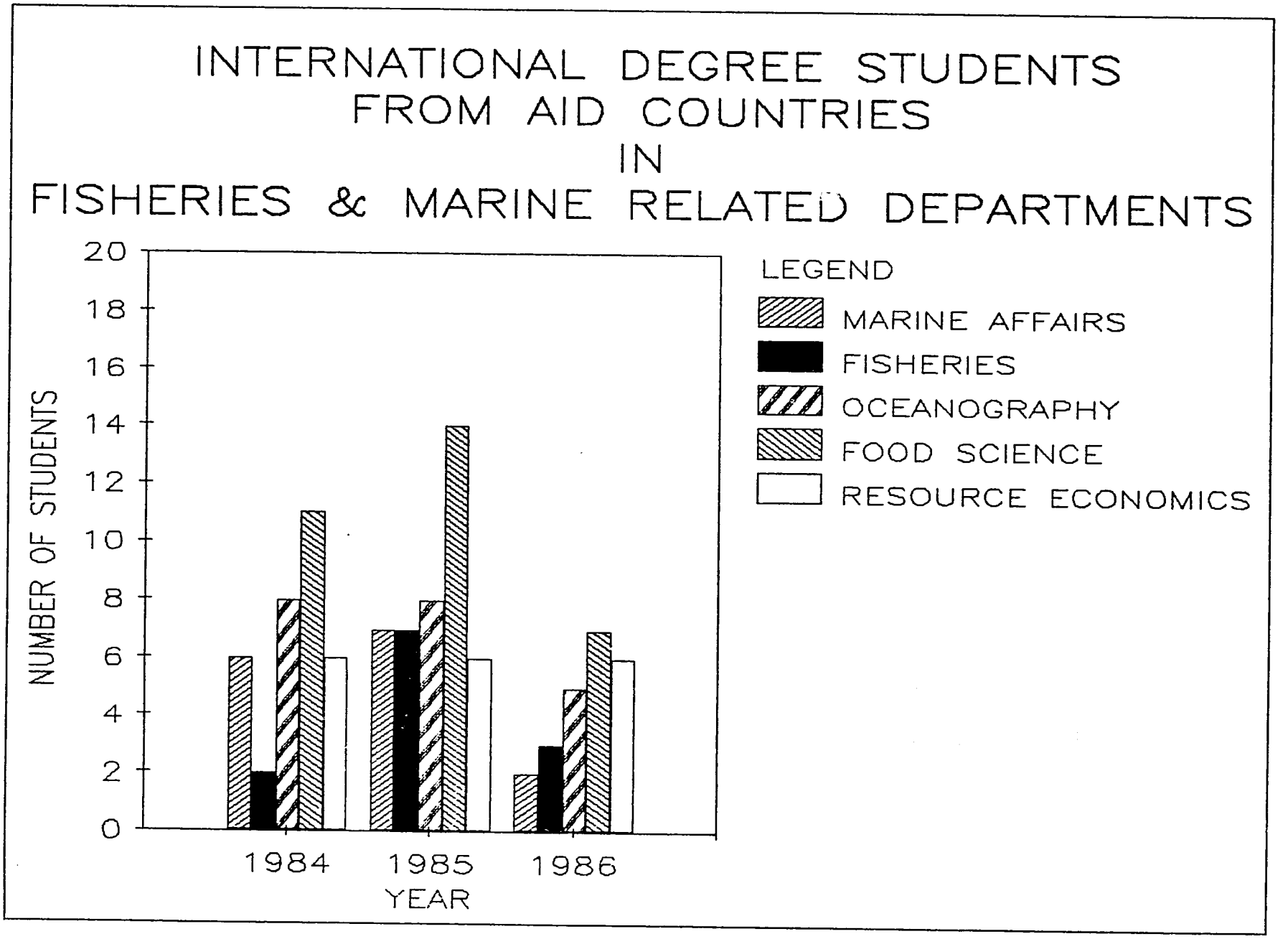

Figure 6 - International Degree Students from AID Countries in Fisheries & Marine Related Departments

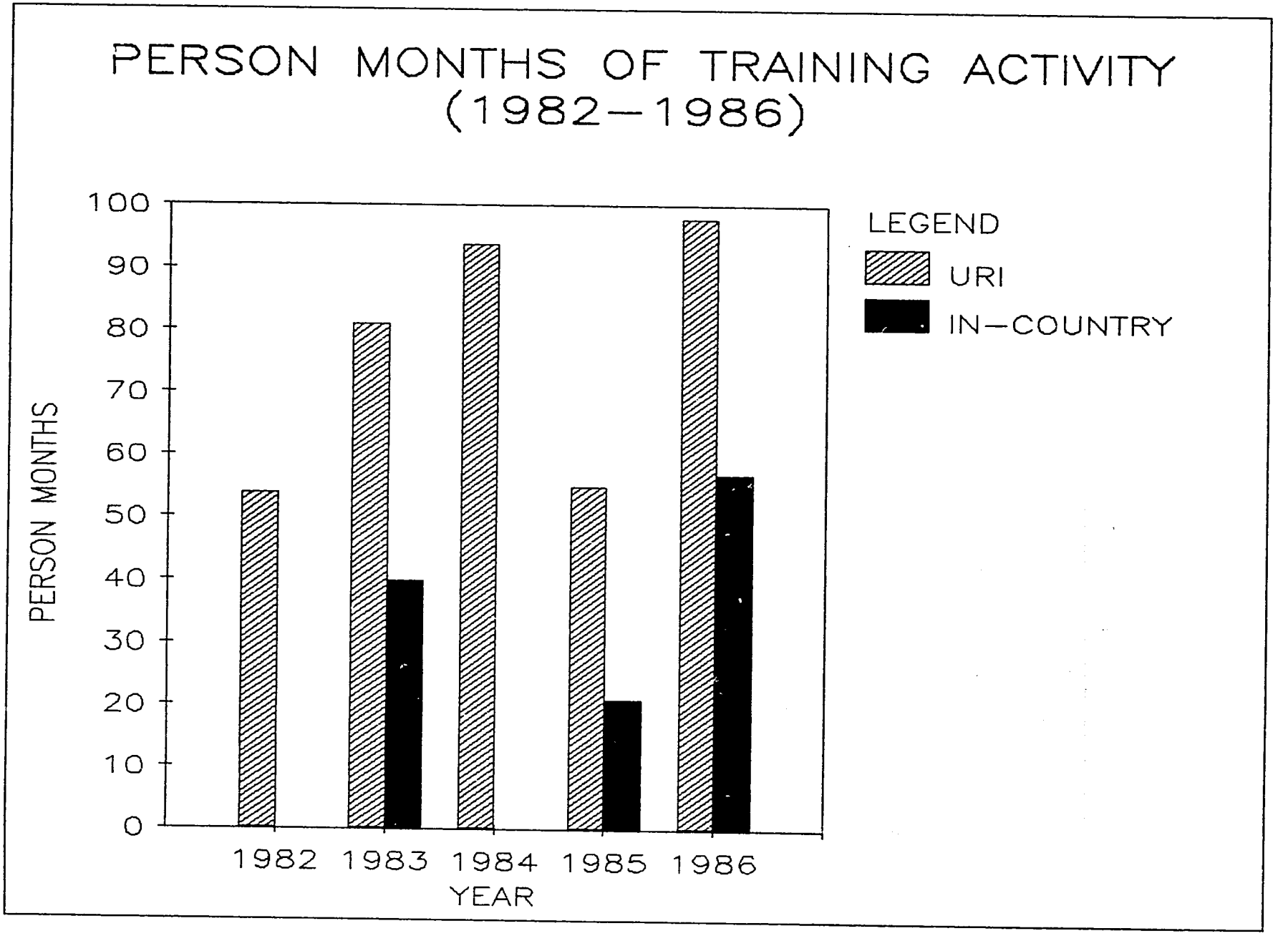

Figure 7 - Person Months of Training Activity (1982-1986)

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1986-1988: Non-Degree Certificate Training for Personnel from the Directorate General of Fisheries, Sultanate of Oman. A number of fisheries officers are undergoing two-year training programs in fisheries. The trainees are divided into four groups: applied fisheries, fisheries science and research, computer data processing and statistics, and applied technology.

1982-1983 & 1984-1985: Project Monitoring and Evaluation for Personnel from the Bureau of Fisheries and Aquatic Resources, Philippines. The fisheries Project Monitoring and Evaluation component of the training program focused on both the theory and mechanics of the process. It emphasized the identification of information needs, techniques for obtaining the data and information, and its use in decision-making. Techniques for using the microcomputer in all phases of the process formed an important aspect of the training.

1984: Preservation and Processing of Fishery Products for Personnel from the Philippines Bureau of Fisheries and Aquatic Resources. ICMRD has conducted a number of short-term trainings for government fishery officers from the Philippines. This dealt with fish processing and food preservation. The participants spent the major portion of their time in the food technology laboratory learning new mathods and appropriate technologies by working directly with their instructor.

1984-1985 Fisheries Stock Assessment for Personnel from the Philippines Bureau of Fisheries and Aquatic Resources. The Fisheries Stock Assessment training dealt with applied fisheries statistics, modular microcomputer programming, and population dynamics. The classwork emphasized regression-based fisheries analysis methods and program techniques to handle very large data sets common in tropical fisheries research. The participants studied the ELEFAN length-frequency programs of Daniel Pauly and others and were introduced to new methodologies being developed at URI specifically for applications in tropical countries.

The past years of student services and training experience has afforded ICMRD the opportunity to demonstrate its ability to perform the following services:

- provide in-country and U.S. training
- organize pre-departure orientation for overseas staff
- provide cross-cultural orientation
- organize orientation for trainees and students in the U.S.
- design a suitable program of study
- arrange logistics of trainee and student housing, travel, shipping, etc.
- provide monthly maintenance allowances following AID regulations
- pay tuition and fees
- provide special allowances (clothing, typing, emergencies, etc.) and medical insurance
- counseling - academic
- counseling - personal/cultural

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- organize student conferences
- arrange for summer school
- arrange for holiday accommodations
- organize trainings in various fisheries technical fields
- monitor progress of trainees
- provide regular feedback to AID on the progress of participants and adhere to Handbook Ten regulations
- develop language training programs
- maintain professional contacts with representatives of various universities involved in international development and training
- build in-house knowledge of academic programs offered i fisheries-related fields throughout the U.S.

What does not show clearly in the above list is the human dimension. Without repeating what has been emphasized above, it is nonetheless relevant here to stress the capability in interpersonal and cross-cultural relations which has been demonstrated by the ICMRD staff in the process of carrying out the above tasks.

ICMRD's successful implementation of numerous training programs has led to a continuing demand for our training services as well as increased our experience and capabilities for fisheries training. ICMRD plans to continue these responsive training activities and expand its efforts by offering three additional certificate training programs in fisheries management which are being planned for 1987 at URI This represents a core training program that can be offered in lesser developed countries or their regions in the future.

Information From the Harvest Sector
May 18 to June 12, 1987

The workshop is designed primarily for those individuals in developing countries responsible for providing information used in making policy decisions affecting small-scale fisheries. The training will prepare participants to design and execute data collection programs to be used to generate information concerning the resource and harvesting sector of the fishery. The training will focus on (1) identification of a minimum set of biological, economic, and socio-cultural information data sets from the small-scale fishery resource and harvesting sector which are necessary for policy decisions, (2) appropriate data collection methods which will generate the needed information, and (3) methods for conversion of data into information that can be used for policy recommendations.

Microcomputer Applications in Fisheries
June 15 to June 26, 1987

This two-week short course will introduce the use of microcomputers to analyze data from the fisheries sector. Data collected through techniques learned in the course on Information from the Harvest Sector can be utilized to prepare economic analysis and to perform appropriate statistical analysis for decision making purposes. The course will focus on the application of widely accepted microcomputer software for

the transformation of data from the fisheries sector into useful information for managers. Participants will have the option to purchase a computer and related software.

Minimizing Postharvest Losses
June 29 to July 24, 1987

This workshop will examine causes and methods for minimizing post-harvest losses in a small-scale fisheries system. The basic causes of post-harvest fishery losses include improper handling, contamination, poor methods and practices for preservation, transportation and marketing. The adaptation and evaluation of improved methods associated with these losses are the basis of this short course.

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In-Country Workshops

ICMRD recognizes that there is a large demand for training programs in fisheries but that not all those in need or deserving training are able to come to the U.S. for training, primarily for financial reasons. ICMRD has started to conduct in-country workshops and trainings in order to overcome some of these constraints and reach a broader number of people. These in-country workshops have been of shorter duration than the U.S. training programs but have reached a larger number of active participants (Table V, Figure 8). In-country workshops and training activities are expected to expand in the future.

Training Manuals

A series of training manuals is being developed in the areas of applied research and related fisheries activities being undertaken by the fisheries development support services cooperative agreement (Table VI). The manuals are intended as guides for core training activities, whether they occur at the University of Rhode Island or at host in-country institutions. These manuals are published and distributed through the ICMRD information services to interested individuals and institutions worldwide. The distribution and use of these manuals multiplies the transfer of critical information in a format that is easy to read and understand by most fisheries workers. Ultimately, this will improve the skills and capabilities of fisheries personnel in developing countries to develop, plan and implement effective fisheries programs.

TABLE V

IN-COUNTRY WORKSHOPS BY URI

Subject & Training Location	Origin of the Participants	Dates of Training	Numbers of Participants
Fisheries Project Monitoring & Evaluation (Manila)	Philippines	7/83-8/83	40
Fisheries Project Monitoring & Evaluation (Manila, Aparri, Davao)	Philippines	6/85	13
Culture of Food Organisms for Shrimp Larvae (ESPOL)	Ecuador	11/28/85-12/9/85	16
Culture of Food Organisms for Shrimp Larvae	Ecuador	4/9/86-4/17/86	10
Collection and Analysis of Social Data From Informants In Fishing Cooperatives	Ecuador	4/86	30
Microcomputer Applications in Fisheries Stock Assessment	Philippines	10/15/86-10/21/86	20
Naval Construction & Design (ESPOL), Ocean Energy Systems (ESPOL)	Ecuador	9/86-12/86	6

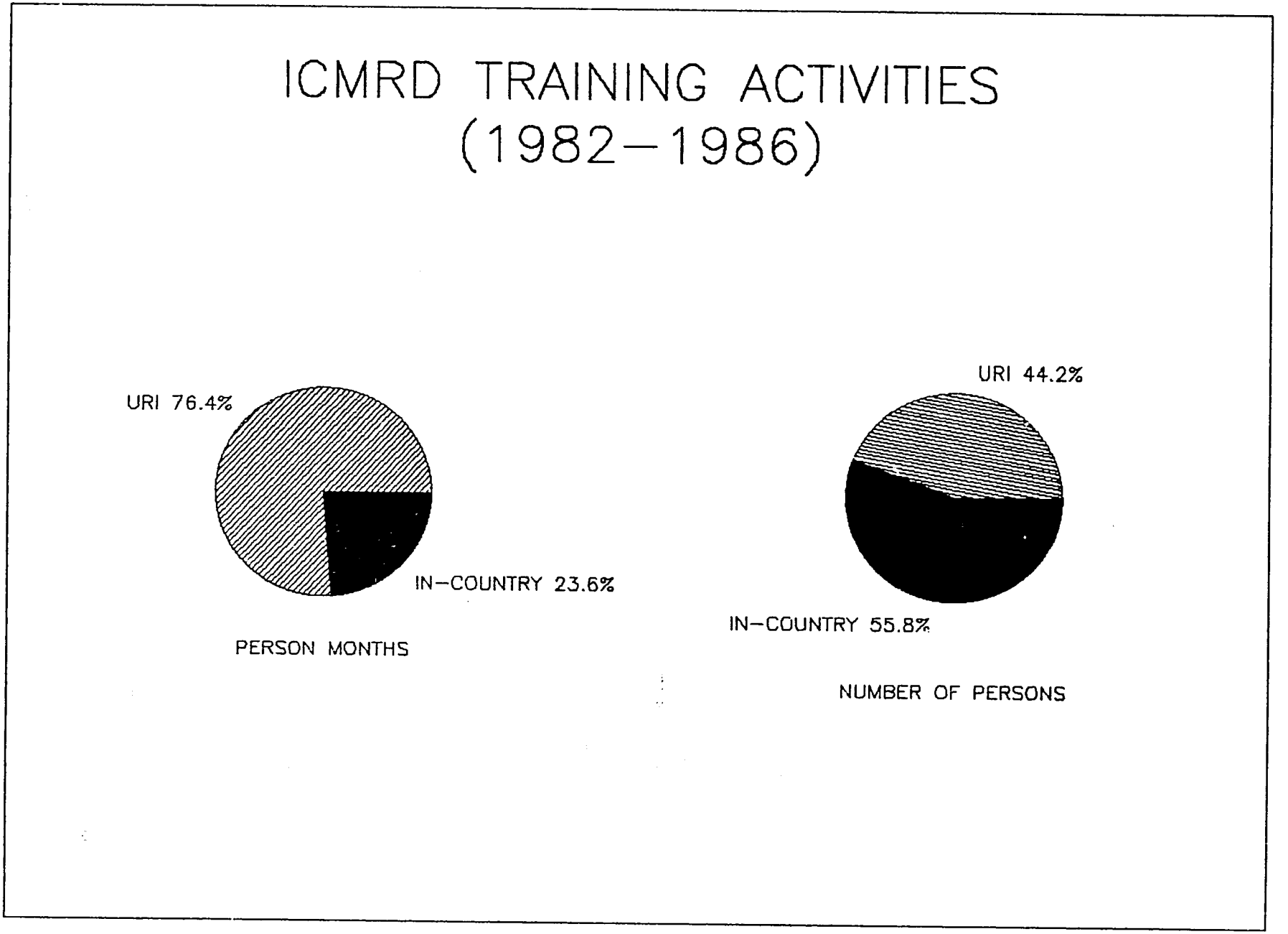

Figure 8 - ICMRD Training Activities (1982-1986)

TABLE VI

TRAINING MANUALS

Title	Authors	Status
A Guide for the Small Scale Fishery Administrator: Information from the Harvest Sector (Spanish and English versions)	D. Stevenson, R. Pollnac & P. Logan	English - Final Spanish - Final
Plywood Workboats for Small-Scale Fisheries	T. C. Visel & W. H. Highsmith	Final
Building the FAO 6-2 Meter V-Bottom Boat	C. Recksiek & A. Giblin	Final Draft
Business Management for Small-Scale Fishermen's Organizations: A Training Program	M. M. Drew	Final Draft
Sociocultural Information Needs for Developing Cooperatives Among Small-Scale Fishermen	R. B. Pollnac	Draft
Seafood Processing and Utilization: Preservation and Processing of Fishery Products	A. Siegel & M. Morrissey	Draft
Bioeconomic Modelling of Fisheries	H. Lampe & P. Logan	Draft
Practical Twinework for Fishermen and Gear Technologists	J. DeAlteris	Draft
Artemia	K. Simpson	Draft
Small-Scale Marine Fisheries Development and Extension	B. Crawford, K. Castro, S. Drew, et al.	Preliminary draft/concept stage
The Fishery Science Applications System (FSAS), A Compendium of Microcomputer Programs and a Manual of Operations	S. Saila, C. Recksiek & M. Prager	Final Draft

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INFORMATION SERVICES

ICMRD has developed a variety of information products to meet the needs of AID fishery development projects. From project specific document production to on-line searching of the world literature on fisheries, the ICMRD Information Service brings cumulative expertise to bear on issues crucial to good fishery project design and execution.

Publications

ICMRD professors consistently write papers on issued affecting small scale fisheries. They are published in two series: 1. anthropology and ICMRD working papers, 2. summary publications or "guides" (see Appendix A).

The Anthropology and ICMRD Working Papers are intended to publish the results of ICMRD research in a rapid, inexpensive format. Papers are usually unbound, mimeographed and are subject to revision as dictated by the authors. Supplies are usually limited, though popular working papers are frequently reprinted.

Summary publications and/or "guides" are meant to be state-of-the-art contributions to fisheries literature. They may be the results of conference, conclusions of large fishery development projects, or summaries of in-depth research on a fundamental topic. They are formally published in substantial quantities.

In addition, ICMRD produces two current awareness publications. The ICMRD Newsletter is distributed to interested persons around the world. It summarizes ICMRD project objectives, reports on current research in progress, announces new ICMRD publications and provides a forum for the exchange of news among international fisheries personnel studying fisheries development. The ICMRD Briefs is distributed to Associates affiliated with ICMRD to keep them informed of new opportunities for further cooperation on AID fisheries concerns. In the past five years, both publications have been distributed to an ever-increasing list of interested persons at home and abroad.

All ICMRD publications are distributed free of charge to AID personnel, persons at work on USAID fisheries projects, scholars in the field and exchange institutions. A list of available ICMRD publications is distributed regularly to those on the ICMRD mailing list and is free upon request.

Information Requests

Since 1971, ICMRD has gathered documents on artisanal fisheries development to benefit AID fisheries projects. The collection now contains some 14,000+ items, many of them "grey" or "fugitive" literature undocumented in other places. ICMRD staffs this library with two full-time professional librarians who respond to requests for information on marine artisanal fisheries topics in all tropical regions. Services range from simple loan of a document to on-line searching of large databases. ICMRD project development personnel

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benefit from access to the collection and from country-specific research files maintained by the information service.

In addition to document purchases (particularly FAO fisheries documents), the collection is enhanced by ICMRD professors who collect documents in-country, and by an active publications exchange program with over 130 exchange institutions around the world. At present, the ICMRD Information Service collection is the only one in North America consistently focused on the collection and dissemination of artisanal fisheries literature world-wide.

Database Development

To facilitate the exchange of fisheries information, the ICMRD Information Service began cataloging its collection using an IBM PC. First products of the database were designed to give ICMRD personnel enrolled in Title XII language classes practical fisheries reading in French and Spanish. In the past year, customized cataloging has produced searchable disks and/or printouts on special topics in fisheries, fisheries of particular countries, fisheries development in FAO statistical regions. Products of the database have supported specific AID projects in Africa, Oman, Ecuador, Sri Lanka, the Pacific Islands, various parts of the Caribbean and a number of countries in Southeast Asia.

AID missions may request database disks or printouts directly from the ICMRD Information Service on either a single request or ongoing basis. The ICMRD database does not include items unless they are owned by ICMRD. Items identified from an ICMRD database search can be loaned or photocopied as appropriate in response to an AID inquiry. As the database project proceeds, it provides an in-depth index to the "grey" literature of fisheries development.

Future Plans

Working with ICMRD professors in the applied research areas, the ICMRD Information Service plans to develop bibliographies of "Recommended Readings" about fisheries development issues. These "Recommended Readings" will guide fisheries personnel to the most relevant literature on particular topics and will be a purchasing guide for in-country information services wishing to enhance their fisheries collections.

As the ICMRD Information Service grows, it becomes increasingly important to mainstream its documentation efforts into those of AID and other international fisheries organizations. Advances in mocrocomputer technology have brought the potential for international networking within the financial grasp of modest in-country information services. The ICMRD Information Service has already provided networking/ microcomputer database advice to a number of AID project-linked institutions in other countries and anticipates a continued demand for this type of information program growth in the future. Future activities might include professional visits by information personnel from abroad, longer training programs for information professionals,

and in-country information training sessions. The ICMRD Information Service maintains consistent contact with international agencies active in the exchange of bibliographic data in fisheries, and it will continue to work with AID Washington and with AID missions to promote the formation of good local, regional and international networks for the exchange of fisheries information.

MEMORANDUMS OF UNDERSTANDING

During the past four years eight Memorandums of Understanding (MOUs) have been signed with research institutions in developed and developing countries. Six MOUs represent agreements with USAID developing countries which encompass all geographic areas of the world (Africa, Latin America and Asia). Although each agreement carries no funding commitment, many accomplishments can be accounted for during the past few years of implementation. Each agreement carries slight differences from the basic agreement set forth in the attached standard document. The basic aim is to foster collaborative endeavors between the institutions. The established linkages permit each institution to seek joint funding, exchange staff, and strengthen the capacities and capabilities of each institution through the cooperative use of materials and facilities which are supportive of the mutually agreed programs.

TABLE VII

MEMORANDUMS OF UNDERSTANDING
Signed by URI/ICMRD 1982 - 1986

INSTITUTION	COUNTRY	EFFECTIVE DATE
Escuela Superior Politecnica del Litoral (ESPOL)	Ecuador	November, 1982
Institut Agronomique et Veterinare Hassan II (IAVHII)	Morrocco	July, 1984
University of Sierra Leone/Institute for Marine Biology and Oceanography (USL/IMBO)	Sierra Leone	May, 1985
The University of Puerto Rico (UPR - Dept. of Marine Science)	Puerto Rico	April, 1985
Kasetsart University	Thailand	May, 1985
University of the Philippines (UPV - College of Fisheries)	Philippines	November, 1985
University of Azores, Portugal (UA - University of the Azores)	Portugal	April, 1986
Shanghai Fisheries College	Peoples Republic of China	May, 1986

The intensity and type of activities vary from agreement to agreement. Major highlights of each agreement are as follows:

Escuela Superior Politecnica del Litoral, (ESPOL), Ecuador

Major joint applied research activities regarding Fisheries Cooperatives, Fisheries Products, Postharvest Losses and development of a crab fishery are currently underway. Short term faculty training efforts are evidenced by seven ESPOL faculty receiving in-service training at the University of Rhode Island during the past two years. Currently the Assistant Dean for Marine Science is enrolled for a M.S. degree in Fisheries Economics. Networking of Information Services is also proposed for pilot testing through the ICMRD information services.

Institut Agronomique Et Veterinaire Hassan II - Morrocco

Administrators at King Hassan II were interested in establishing this agreement to assist them develop a Marine Fisheries program. Under the University of Minnesota Training Agreement, several students and trainees have enrolled in degree and short term training programs in fisheries economics.

One graduate student from the Institute Agronomique et Veterinaire Hassan II completed a twelve month program of coursework in fisheries stock assessment at the University of Rhode Island.

The University of Sierra Leone, Institute for Marine Biology and Oceanography (USL/IMBO), Sierra Leone

This agreement has provided opportunities for exchange of faculty, enrollment of a Ph.D. candidate in Fisheries Economics, and a feasibility study involving the role of women in fisheries development.

The University of Puerto Rico (UPR) Marine Science Department, Puerto Rico

This agreement with another Title XII institution has provided a unique opportunity for expanding our training efforts in a tropical location. To date over sixty Peace Corps volunteers have received fisheries training through our program conducted jointly with the University of Puerto Rico. The established training facility will also be utilized for a portion of our USAID Omani fisheries training.

Kasetsart University: Thailand

This agreement has focused on quality production of Artemia. Currently a Kasetsart University faculty member is enrolled in the doctoral program in the Department of Food Science and Nutrition at the University of Rhode Island. Upon completion of her degree, she will return and manage the research laboratory for Artemia at Kasetsart University. Other inquiries regarding fisheries product losses have been discussed as an area for further collaboration.

University of the Philippines, College of Fisheries (UPVCF), Philippines

The University of the Philippines College of Fisheries is currently launching a new facility and program in the Visayas. In the future it is thought to be comparable to the Agriculture program at Los Banos.

To date, three faculty mambers have enrolled in graduate programs at URI. One has completed the Master of Marine Affairs program. Two are currently undertaking a doctoral program in resource economics and a master's program in fisheries.

Joint applied research efforts are under discussion for implementation. The first major effort is being implemented under the Collaborative Research Support Project (CRSP) in Fisheries Stock Assessment. The project's aim is to develop new methods in tropical fisheries stock assessment and involves collaboration between both U. S. and developing country institutions. A URI scientist is on long term assignment at the University of the Philippines marine field station in Bolinao. UPVCF scientists and graduate students are actively involved in the field studies and empirical modeling project components of this program.

University of Azores, Portugal

This recent agreement was developed after an institutional building project during the 1978 - 1983 period. Joint applied research efforts are identified and have been submitted for potential funding to USDA and the LUSO American Foundation. These include: Japanese Beetle Control, Production of Cheese Enzymes from Fishery Waste, and Human Nutrition.

Shanghai Fisheries College, Peoples Republic of China

This most recent agreement has only one activity to date, the enrollment of a Shanghai Fisheries College faculty member in the fisheries science Master's degree program.

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APPENDIX A
WORKING PAPERS
(1982-1986)

ICMRD Working Papers

Brainerd, T. R. July 1986. Lessons from Fisheries Development in West Africa: Overview. ICMRD Working Paper #9.

Lepiz, L. G. and Jon G. Sutinen. February 1985. Surveillance and Enforcement Operations in the Costa Rican Tuna Fishery. ICMRD Working Paper #14.

Hendrix, M. H. November 1984. Technical Change and Social Relations in a West African Maritime Fishery: A Development History. ICMRD Working Paper #21.

Brainerd, T. R. June 1984. Lessons from Fisheries Development in West Africa: Artisanal Fisheries, Senegal. ICMRD Working Paper #13.

Brainerd, T. R. June 1984. Lessons from Fisheries Development in West Africa: Artisanal Fisheries, Guinea Bissau. ICMRD Working Paper #12.

Brainerd, T. R. June 1984. Lessons from Fisheries Development in West Africa: Oyster Culture Project, Sierra Leone. ICMRD Working Paper #11.

Brainerd, T. R. June 1984. Lessons from Fisheries Development in West Africa: Purse Seine/Trawler Construction, Ghana. ICMRD Working Paper #10.

Hendrix, M. K. 1983. Technology and Tradition in West African Maritime Fisheries: Tombo, Sierra Leone. ICMRD Working Paper #8.

Epler, B. June 1983. The Fisheries of Guinea-Bissau. ICMRD Working Paper #7.

Anthropology Working Papers

Pollnac, R. B. December 1985. Sociocultural Issues in West African Fisheries Development. Anthropology Working Paper #45.

Pollnac, R. B. September 1984. The Division of Labor by Sex in Fishing Societies. Anthropology Working Paper #44.

Pollnac, R. B. January 1984. Sociocultural Aspects of Small-Scale Fisheries Development in West Africa. Anthropology Working Paper #43.

Pollnac, R. B., A. Dickson, N. Razo and A. Sualog. August 1982. The Effects of Formal Education and Government Services on Aquaculture Practices in Region II of the Philippines. Anthropology Working Paper #42.

Bibliographies

Hendrix, M., T. Brainerd and T. Omara-Alwala. June 1984. A Working Bibliography on East African Fisheries. ICMRD.

APPENDIX B
PARTIAL LIST OF ACRONYMS
IN THE FDSS PROGRESS REPORT

AID - Agency for International Development
BFAR - Bureau of Fisheries & Aquatic Resources
CONVEP - Consejo Nacional de Universidades Y Escuelas Politecnicas
CRSP - Collaborative Research Support Project
ELEFAN - Electronic Length Frequency Analysis
ESPOL - Escuela Superior Politecna del Litoral
FAO - Food and Agriculture Organization
FDSS - Fisheries Development Support Services
FSAS - Fishery Science Applications System
ICMRD - International Center for Marine Resource Development
IFA - International Fisheries Association
LDC - Lesser Developed Countries
MOU - Memorandum of Understanding
P/D - Person Days
S&T/RNR - Bureau of Science & Technology/Renewable Natural Resources
TDY - Temporary Duty Assignments
UPR - University of Puerto Rico
URI - University of Rhode Island
USAID - United States Agency for International Development

REPORT OF THE COORDINATED ACTIVITIES BETWEEN ESPOL AND ICMRD
During the Period of May, 1985 - October 1986

1. During the month of May - June, 1985, Dr. Harlan Lampe, Dr. Jon Sutinen, Dr. Don McCreight, Dr. Manuel Hernandez (Puerto Rico), Dr. Alvin Seigel, Asst. Prof. Joseph DeAlteris and Dr. John Poggie visited ESPOL for the purpose of structuring cooperative programs between the University of RI, ESPOL, Costa Rica and Puerto Rico. During this visit, Drs. Siegel and DeAlteris aided the School of Technology in the areas of Food Science and Fisheries in the revision of their curriculum. Dr. John Poggie visited various fishery cooperatives in Ecuador.

2. May, 1985, Dr. Ken Simpson visited ESPOL's shrimp larve laboratory and had working sessions with the director of the laboratory, Edgar Arellano. They developed a program of cooperation with the following activities:

a. December 4 - 6, 1985 and April, 1986, visit by Dr. David Benston, an ICMRD consultant, to give seminars on shrimp culture.

b. During May, 1986, Mariano Montano from ESPOL attended the University of Rhode Island to receive training in Artemia research.

c. Development of a plan of the use of Artemia in the larve laboratory in Ecuador. Representatives from the University of Belgica were also invited to participate in this work.

3. Miguel Fierro from ESPOL and Dr. John Poggie from ICMRD developed a research program to evaluate the activities in the artesanal fisheries cooperatives in Ecuador. Research activities were:

a. March, 1986, Dr. Poggie helped prepare questionnaires and research formats for obtaining information from the fishing cooperatives.

b. June, 1986, Dr. Poggie helped analyze information gathered from the fishery cooperatives.

4. In April, 1986, Cristobal Mariscal, Bolivar Vaca and Enrique Jo visited University of Rhode Island for three months, defining collaborations between the two institutes, expecially in the areas of Ocean Engineering, Acquaculture and improving Information Services that presently exist at ESPOL. Concrete results from this visit include:

a. one month's research project done by Asst. Professor Joseph DeAlteris and Kathy Castro with ESPOL counterparts Bernardo Zapata and Eduardo Posligua in investigating the utilization of crab resources in Ecuador. Project proposals were presented to AID and in-country funding agencies to implement this research project.

b. Mary Jane Beardsley, ICMRD Information Services, gave consultancy advice to the libraries at ESPOL and CICYT to improve the retrieval of information especially for scientific investigation. Also, information was given on the initiation of a national service for libraries in the area of Ocean Sciences.

5. In October, 1986 Dr. Michael Morrissey visited ESPOL to develop projects in the area of shrimp by-catch and reduction of post harvest fishery losses. Seminars were given at ESPOL on both these topics. Preliminary projects were formulated with ESPOL counterparts Luis Mirinda and Miguel Fierro. An in-country workshop on post harvest fishery losses in the artenesal fisheries is being planned for February. A proposed research project on the utilization of fish for the development of shrimp diets is being considered between ESPOL, ICMRD and Nestle of Ecuador.

Exchange professors, June, 1986. Dr. Tadeus Kowalski, a faculty member from the University of Rhode Island, Ocean Engineering, is spending a sabbitical at ESPOL from June to December, 1986.

Marco Velarde from ESPOL began his post graduate research in the area of Resource Economics at University of Rhode Island.

In September, 1986, Dr. Lester Leblank gave a seminar entitled "Methodologies for obtaining various oceanographic measurements."