

SUMMARY

A. Summary Statistics

Title: Fisheries Development Support Services (FDSS)

Contractor: The 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 - 30 June 1987

AID Funding: Phase I. \$1,313,500

B. 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 accordance 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 in 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 workplan to be more goal oriented, with defined objectives and outputs. Work was begun in this regard at the beginning of the calendar year 1985. A consultant was hired with experience in management by objectives and project design to assist in this process. The outcome was a division into five principle subject areas: 1. fisheries management, 2. sociocultural factors, 3. use of mariculture, 4. postharvest fishery technology, and 5. resource utilization.

The four major objectives of the program are:

1. provide technical assistance to AID and LDCs in problem identification, evaluation of opportunities, planning and utilization of fisheries resources, especially in the subject area of sociocultural factors, fisheries management, use of mariculture, postharvest technology, and resource utilization,
2. provide library and information services for small-scale fisheries development to LDCs.
3. develop and provide long- and short-term degree and non-degree training in fisheries development for USAID and LDC institutions and agencies,
4. conduct applied research efforts and transfer of technology in the following areas of fisheries development:
 - fisheries management
 - sociocultural factors
 - use of mariculture
 - postharvest fishery technology
 - resource utilization

The Cooperative Agreement provides for an umbrella organization to coordinate, plan and conduct fishery development activities. The plan called for a 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 as well as 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: sociocultural factors, fisheries management, resource utilization, mariculture and postharvest fishery technology. The program has a flexible structure which can incorporate new areas 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.

C. Accomplishments

1. Technical Assistance

The International Center for Marine Resource Development (ICMRD) has responded to requests for technical assistance from (16) USAID developing countries, one Regional USAID Bureau, and USAID S&T/AGR/RNR. These responses involved 1156 person days of TDY and 52 persons. Fisheries development support services were provided in the areas of fishery management, resource utilization, sociocultural factors associated with development, fishing technology, mariculture, and postharvest handling. Over the five-year period, the number of requests increased as the availability and quality of ICMRD's technical assistance became more broadly recognized.

2. 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 technology has demonstrated the need of workshops to train personnel in preservation and processing techniques. A training program of middle management people from the Philippines has been run and an international workshop to formulate research guidelines in this area was 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 conducted and is now being analyzed.

3. Training

ICMRD has assembled a professional training team which has responded to the various specialized training needs of AID and LDCs. ICMRD's coordinating role has resulted in a unique capability to offer training in virtually all aspects of marine fisheries.

ICMRD conducted twenty-three specialized non-degree training programs at URI and affiliated institutions and eight in-country workshops over the five-year period of 1982 to 1987. Non-degree training participants numbered one-hundred and sixteen individuals at trainings in the U.S. and one-hundred and forty-seven individuals at in-country workshops. Degree training in fisheries and marine related programs at URI averaged 32 students annually from AID countries. There has been a general trend during the last five years towards an increase not only in the total number of persons trained annually but in the total number of annual person-months of training activity. This demand for training is expected to continue.

4. Information Services

The ICMRD Information Service has distributed annually 1300 to 1700 ICMRD documents to fisheries development personnel, not including the ICMRD Newsletter, or Briefs. In addition, it has distributed an average of 3000 pages per year of reference materials in response to subject requests. The information service has designed individual programs for librarians visiting ICMRD to research issues of fisheries information service development. The service regularly prepared information packages on target countries and issues for AID in-country projects, and 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 of the database or a printout of documents available from the Information Service.

D. Utilization and Impact

The use of Fisheries Development Support Services (FDSS) has intensified and accelerated over the four years of project operation. This has been demonstrated by the number of technical assistance consultations, the number of degree and non-degree training participants, the number of in-country workshop participants and training programs, publications (including working papers, Newsletters training manuals, journal articles, and the document collection), and established linkages through Memorandums of Understanding with LDC institutions and agencies.

An outside review panel reviewed the Cooperative Agreement in November of 1986 and made the following observations:

"In General, the review panel is more 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, technical 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."

5

TABLE II
 TECHNICAL ASSISTANCE ACTIVITIES OF FDSS
 SUMMARY of 1983 - 1987

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			1	30	3	100
Djibouti	1	14					2	30	3	44
Ecuador					8	113	11	210	19	329
Fiji							1	30	1	30
Guatemala							1	30	1	30
Honduras	1	14							1	14
India							1	15	1	15
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	25	544	52	1156

*Includes activities from January 1, 1987 to June 30, 1987.

6

TABLE III
1986 TECHNICAL ASSISTANCE IN DEVELOPING COUNTRIES

REGION AND DEVELOPING COUNTRY	PERSON MONTHS	AREA OF TECHNICAL ASSISTANCE	CONSULTANT OR URI FACULTY
<u>Southeast Asia</u>	<u>5.25</u>		
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
<u>Latin America</u>	<u>7.0</u>		
Ecuador	1.0	Fisheries Cooperatives	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
Guatemala	1.0	Fisheries Sector Study	Lampe/URI
<u>South Pacific</u>	<u>1.0</u>	Status of Fisheries Development	Helfrich
<u>Near East</u>	<u>.50</u>		
Oman	.50	Training Design and Selection of Participants	McCreight/URI Aelion/URI
TOTAL PERSON MONTHS OF ASSISTANCE	13.25		

TABLE IV
 TRAINING PROGRAMS AT URI
 AND AFFILIATED INSTITUTIONS IN THE U.S.
 1982-1987

Subject	Origin of the Participants	Dates of Training	Number of Participants
Microcomputer Applications in Fish Stock Assessment	Costa Rica	6/87	1
Culture of Food Organisms for Paneid Shrimps	Ecuador	10/86	1
Oceanography & Fisheries Science	Philippines	9/86-12/86	1
Lipidology and Pesticide Research w/Artemia	Ecuador	8/86-9/86	1
Commercial Fisheries Development & Extension	U.S. Peace Corps Destination: Tunisia	7/86	3
Fishery Science and Technology	Sultanate of Oman	5/1986-88	11
Naval Engineering	Ecuador	5/86	2
Marine Sciences & Fisheries Information Services	Philippines	10/85	1
Oceanographic Instrumentation Repair and Maintenance	Philippines	8/85	2
Small-Scale Marine Community Fisheries Development & Extension *	U.S. Peace Corps Destination: 10 Turks & Caicos, Dominican Republic, Jamaica, Tonga, Haiti Sierra Leone	7/85-9/85	18
Fisheries Project Monitoring and Evaluation	Philippines	11/84-2/85	3
Fisheries Project Development and Management	Philippines	11/84-2/85	3
Stock Assessment	Philippines	11/84-2/85	2

TABLE IV (Cont'd)

Subject	Origin of the Participants	Dates of Training	Number of Participants
Small Scale Marine Community Fisheries Development & Extension*	U.S. Peace Corps Destination: Morocco, Turks & Caicos	7/84-9/84 1/84-2/84	7 15
Preservation & Packaging of Fishery Products	Philippines	2/84	10
Freshwater Shrimp Culture & Production Techniques	Spain	1/84-3/84	1
Small-Scale Marine Fisheries Development & Extension*	U.S. Peace Corps Destination: Tunisia, Sierra Leone Morocco, Papua, New Guinea	7/83-9/83	19
Marine Mechanical Engineering & Fisheries Marine Technology	Sri Lanka	6/83-6/84	1
Fisheries Economics	Indonesia	9/82-5/84	3
Fisheries Project Monitoring & Evaluation	Philippines	6/82-7/82	8
Fisheries Management	Nigeria	1/82-1/83	1
HPLC Analysis of Carotenoids		8/81-8/82	1
Artemia & Advanced Analytical Instrumentation	Philippines	7/81-7/82	1

*Trainings or portions of trainings conducted jointly between The University of Rhode Island and The University of Puerto Rico at the UPR Marine Station in Puerto Rico.

TABLE V
IN-COUNTRY WORKSHOPS BY URI

Subject & Training Location	Origin of the Participants	Dates of Training	Numbers of Participants
Development of a Crab Fishery (ESPOL)	Ecuador	1/10/87	12
Microcomputer Applications in Fisheries Stock Assessment (Manila)	Philippines	10/15/86- 10/21/86	20
Naval Construction & Design (ESPOL), Ocean Energy Systems (ESPOL)	Ecuador	9/86-12/86	6
Culture of Food Organisms for Shrimp Larvae (ESPOL)	Ecuador	4/9/86- 4/17/86	10
Collection and Analysis of Social Data from Informants in Fishing Cooperatives (ESPOL)	Ecuador	4/86	30
Culture of Food Organisms for Shrimp Larvae (ESPOL)	Ecuador	11/28/85- 12/9/85	16
Fisheries Project Monitoring & Evaluation (Manila, Aparri, Davao)	Philippines	6/85	13
Fisheries Project Monitoring & Evaluation (Manila)	Philippines	7/83-8/83	40

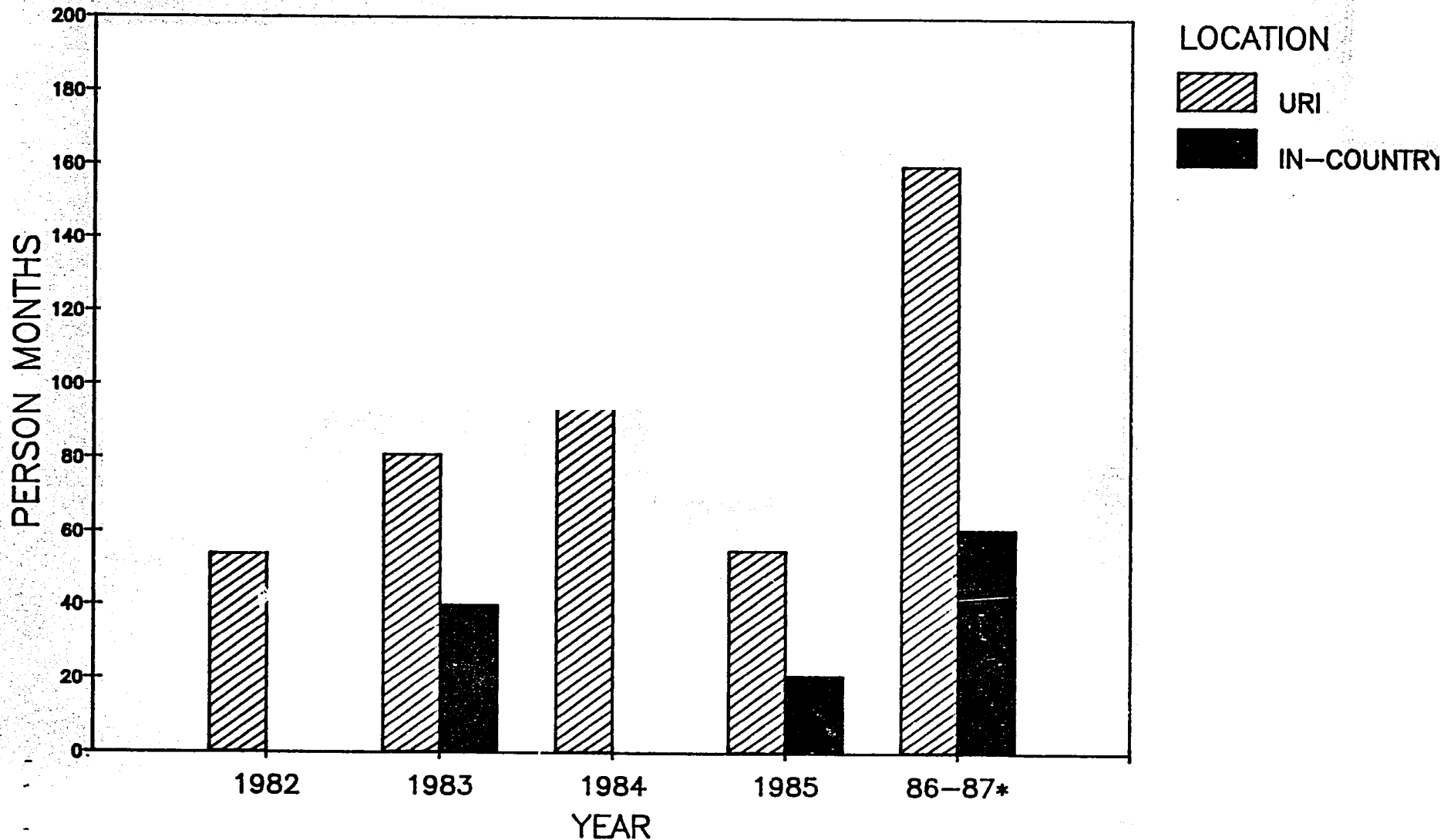
TABLE VI
TRAINING MANUALS

<u>Title</u>	<u>Authors</u>	<u>Status</u>
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
Soicocultural Information Needs for Developing Cooperatives Among Small-Scale Fishermen	R.B. Pollnac	Final Draft
Seafood Processing and Utilization: Preservation and Processing of Fishery Products	M. Morrissey	Final Draft
Practical Twinework for Fishermen and Gear Technologists	J. DeAlteris	Final Draft
<u>Artemia</u>	K. Simpson	Draft
The Fishery Science Applications Systems (FSAS): A Compendium of Microcomputer Programs and a Manual of Operations	S. Saila C. Recksiek & M. Prager	Final Draft

TABLE VII
MEMORANDUMS OF UNDERSTANDING
Signed by URI/ICMRD 1982 - 1987

<u>INSTITUTION</u>	<u>COUNTRY/LOCATION</u>	<u>EFFECTIVE DATE</u>
Instituto Tecnologico y de Estudios Superiores de Monterrey Guaymas Campus (ITESM)	Mexico	June 1987
International Center for Living Aquatic Resources Management (ICLARM)	Philippines	Apr. 1987
Southeast Asian Fisheries Development Center (SEAFDEC)	Philippines	March 1987
Shanghai Fisheries College	People's Republic of China	May 1986
University of the Philippines in the Visayas, College of Fisheries (UPVCF)	Philippines	Nov. 1985
Kasetsart University	Thailand	May 1985
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	Apr. 1985
University of the Azores (UA)	Portugal	Apr. 1985
Institut Agronomique et Veterinaire Hassan II (IAVHII)	Morroco	July 1984
Escuela Superior Politecnica del Litoral (ESPOL)	cuador	Nov. 1982

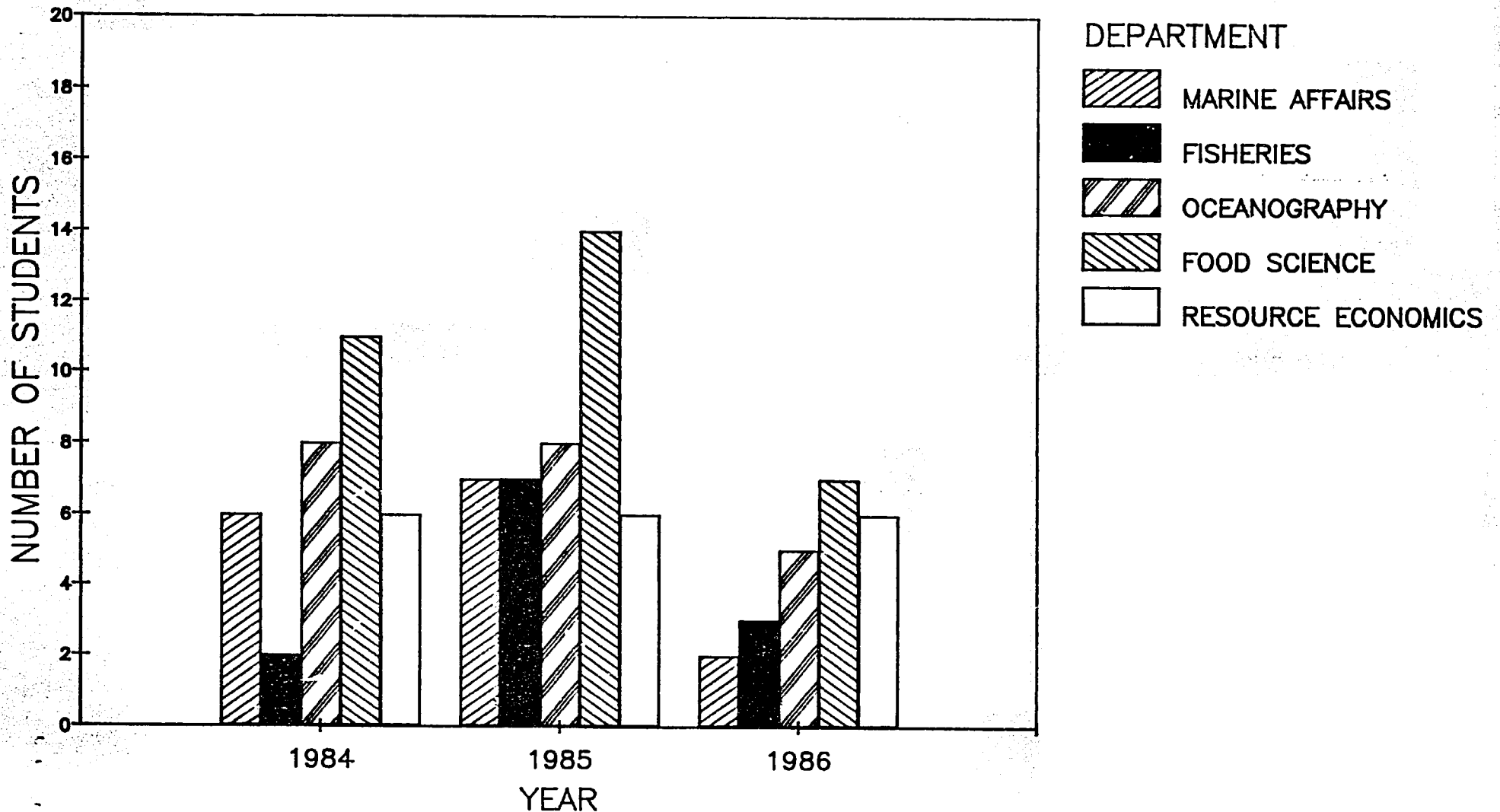
PERSON MONTHS OF TRAINING ACTIVITY (1982-1987)



* includes activities from 1/1/86 - 6/30/87

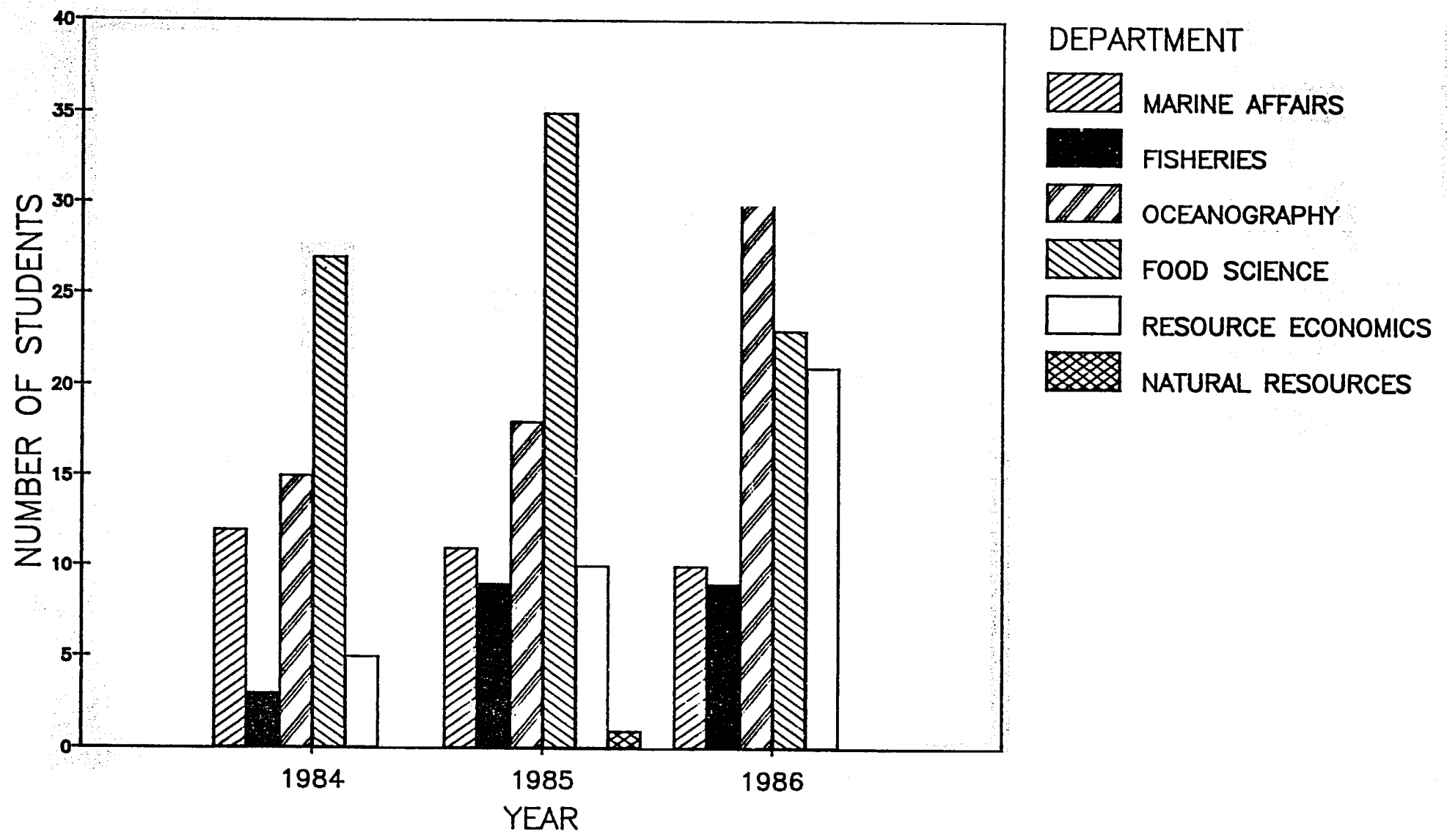
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INTERNATIONAL DEGREE STUDENTS FROM AID COUNTRIES IN FISHERIES & MARINE RELATED DEPARTMENTS



* 1982 & 1983 data not available

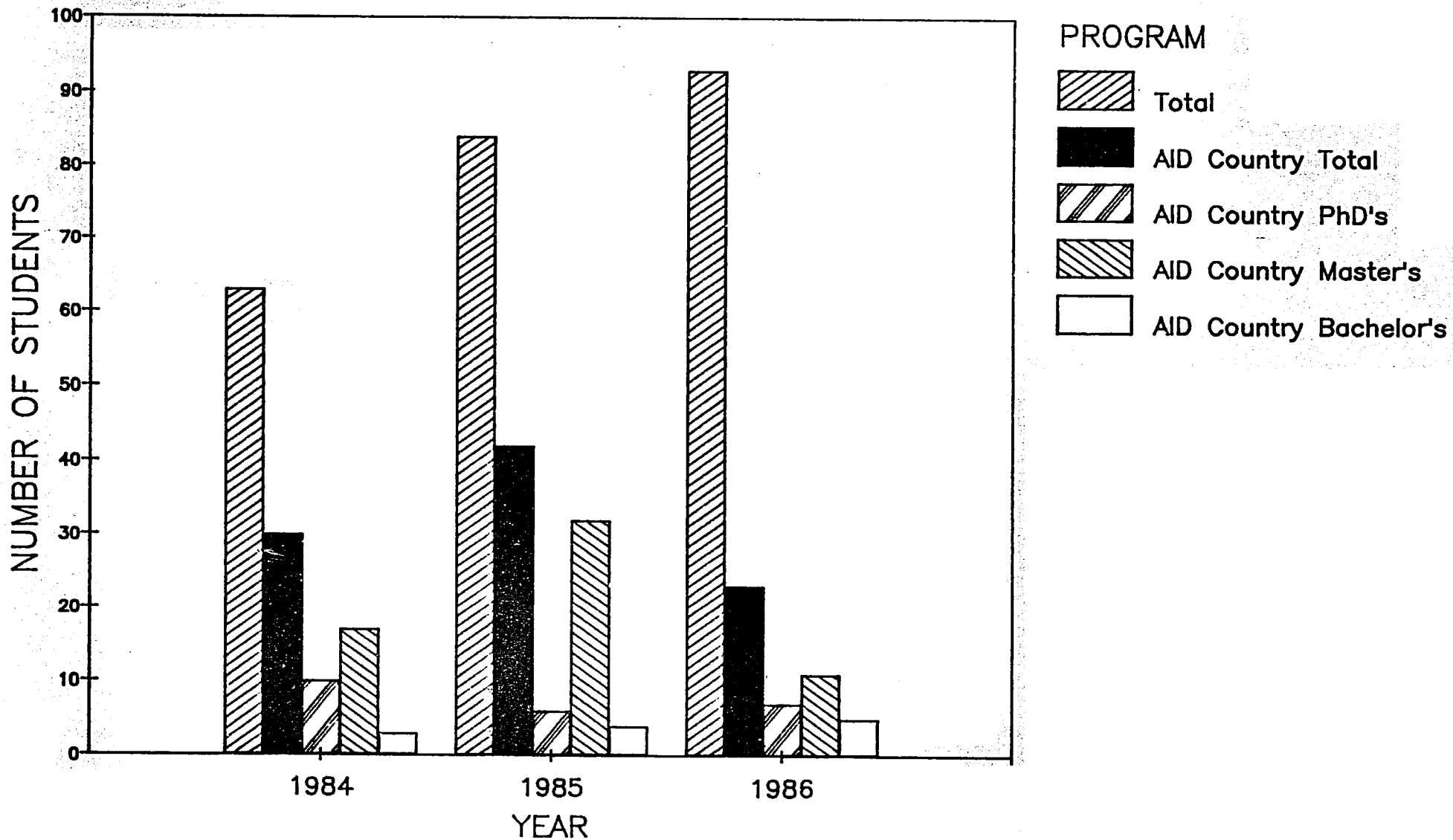
INTERNATIONAL DEGREE STUDENTS IN FISHERIES & MARINE RELATED DEPARTMENTS



1982 & 1983 data not available

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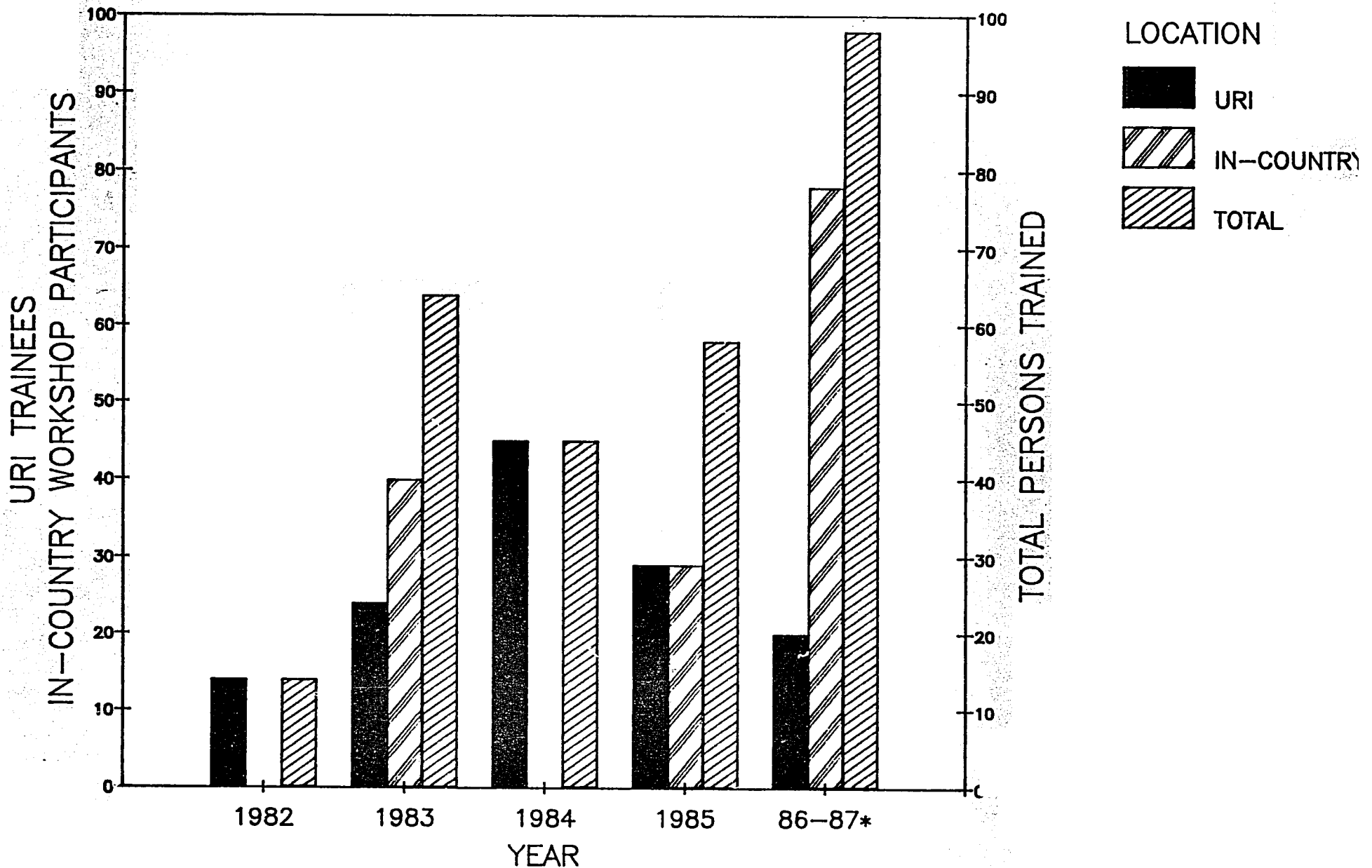
INTERNATIONAL DEGREE STUDENTS IN FISHERIES & MARINE RELATED PROGRAMS



* 1982 & 1983 data not available

91

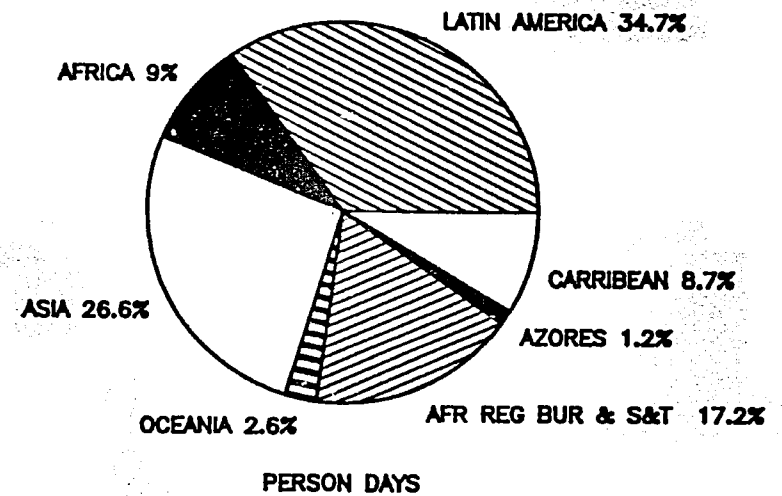
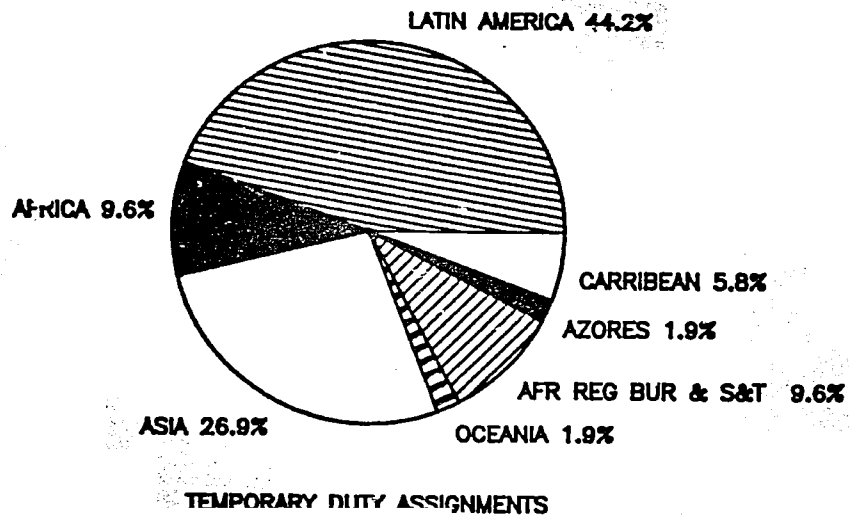
NUMBER OF PERSONS TRAINED BY ICMRD



* includes activities from 1/1/86 - 6/30/87

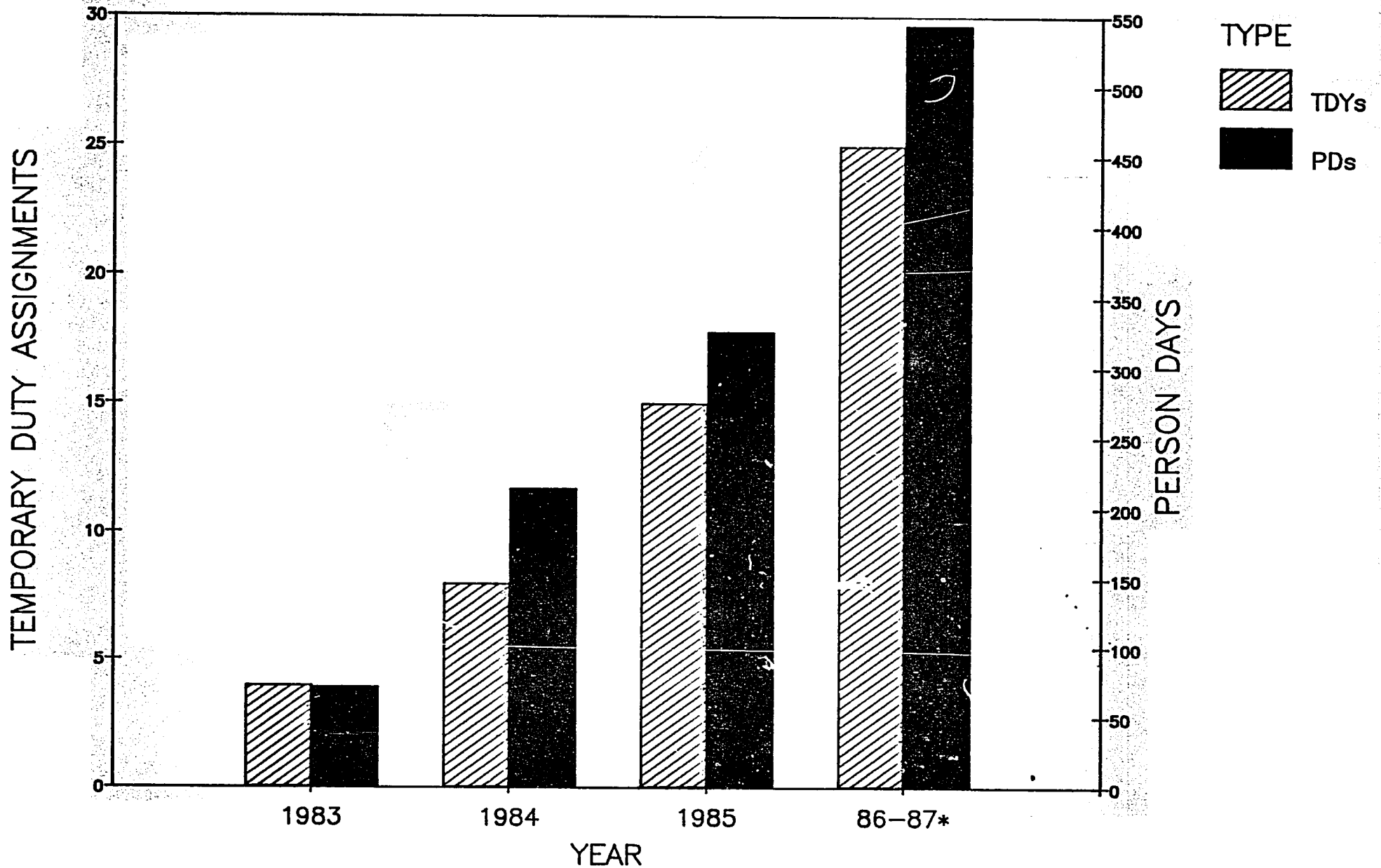
17

TECHNICAL ASSISTANCE ACTIVITIES BY REGION (1983-1987)



81

TECHNICAL ASSISTANCE ACTIVITIES



* includes activities from 1/1/86 - 6/30/87

61

SUMMARY OF IMPACTS: PHASE I

ICMRD, for the most part, has not been directly involved in the implementation of development projects. The involvement has been indirect and in the form of preparing fishery sector studies, conducting applied research which is subsequently transferred to LDC scientists and fishery personnel, providing expert consultations for LDC fishery personnel and projects, and operating formal training programs with the objective of improving the fishery to increase production, income of fishermen, foreign exchange, and the overall quality of life in LDC fishing communities.

Impacts can be identified in many areas. For example, trainings and consultations were provided for personnel at the Southeast Asian Fisheries Development Center (Philippines) concerning detailed biochemical analyses of feeds and water quality, all factors important in the culture of marine organisms. ICMRD mariculture specialists have helped develop and transfer appropriate techniques for identifying chlorinated hydrocarbons in water which adversely impact mariculture production. Additionally, they have trained and consulted with faculty from Thailand, the Philippines, and Ecuador concerning analysis of fatty acid profiles in brine shrimp. Fatty acid profiles of this important mariculture feed can greatly influence mortality and growth rates, hence directly influencing mariculture production.

Postharvest loss applied research has been input to training programs run for Bureau of Fisheries and Aquatic Research (BFAR) Training Division personnel from the Philippines. These personnel are now leading the in-country training of middle level and lower level personnel who are conducting extension work that is having positive impacts in fishing communities by reducing post-harvest losses and improving the quality of fishery products. Related to this is a fishery training project monitoring and evaluation program which was implemented by the Bureau of Fisheries and Aquatic Research in the Philippines. This program has resulted in a plan which not only uses adequate socioeconomic and fishing technology baseline data to select training projects, but monitors and evaluates the results of the training. The ICMRD social scientist who helped set up the program has participated in several follow-up evaluations to determine impacts of specific trainings. In both Palawan and northern Luzon, the post-evaluation of training of marine fishermen indicate that those involved in the training and/or adopting the technology have increased production, incomes, and household elaboration as indicated by a comparison of baseline and evaluation surveys.

Finally, concerning resource utilization, non-utilized species of a "blue crab" (*Callinectes toxotes* and *C. arcuatus*) and its distribution was identified in Ecuador. Capture technology was suggested by ICMRD personnel, and the crab is now being harvested, in part for limited export, bringing new earnings and employment to the small-scale fishermen.

Training

It is difficult to quantify the direct impact that training activities have on income level of fishermen, employment, fish production, consumption of fish, and resource management in LDCs. Indirectly, the training of LDC scientists and fisheries administrators at both the degree and non-degree level are felt to have significant long-term impacts on the quality of applied research and development planning in the fisheries sector. Traditionally, U.S. trained individuals upon graduation are promoted to high-level positions within their respective agencies and are therefore in a direct position to have an influence on matters pertaining to policy and management of fisheries.

Expanding training programs to in-country trainings and workshops, to reach a wider audience of people that do not have the opportunity to come to the U.S., increases the transfer of technical expertise in the use of state of the art methods and techniques related to the priority areas of the cooperative agreement.

Mariculture

1. In 1981 a situation existed at the Southeast Asian Fisheries Development Center which resulted in the researchers not being able to get detailed analyses of their experimental feeds, water, etc. The basic problem was that they did not have the trained people who could provide more than crude lipid protein, etc. Mrs. Oseni Millamena came to URI under AID support to learn some biochemical techniques. She also did research on samples which were sent here from the Philippines which resulted in three publications. In 1982 Mrs. Millamena returned to SEAFDEC and was appointed head of the central analytical laboratory, and now that laboratory provides detailed biochemical data with which the researchers are able to evaluate their results and to base further research. This is important since the value of a protein or lipid often is not based on the level only but on the amino acids and fatty acids which make up the crude macronutrient.

2. The chlorinated hydrocarbons are very persistent in the environment and have been placed there because of their use in agriculture and industry. The presence of their compounds in the water affects the aquatic organisms and thus enters the food chain. On one of the trips that Dr. Kenneth L. Simpson of the University of Rhode Island made to the Philippines, samples of brine shrimp were collected from the ponds of SEAFDEC at Iloilo, the level of lindane was found to be extremely high and had these artemia been fed to fish or shell fish, the results would have been very poor. A similar analysis was made the next year and no lindane was found. As a result of these analyses, SEAFDEC acquired the capability of determining the level of the chlorinated hydrocarbons from the water and URI trained the person who could do the work. The pond manager now has the ability to select the water quality of the experimental pond system.

3. In work done at URI it was determined that some batches of brine shrimp support good survival and growth of the predator, while others may result in up to a 100 percent mortality or poor growth. It has now been conclusively proven that the major cause of this problem with some brine shrimp is the fatty acid profile. A couple of fatty acids have been found to indicate good or poor quality. It is not a simple case of one geographical location always yielding good artemia and another poor. We have shown that samples from Utah, San Francisco, Thailand, Ecuador and the Philippines can yield good or poor fatty acid profiles.

To date URI has trained faculty members from Universities in Thailand, the Philippines and Ecuador in fatty acid analysis of brine shrimp. In the case of Ecuador, we assisted in the purchase of used equipment (gas liquid chromatograph), shipped it to Ecuador and helped set it up. ESPOL will now be able to assist in the purchase of quality brine shrimp and determine the quality of the domestic product. Formerly we have analyzed batches of brine shrimp for the Ecuadorian shrimp hatcheries and made recommendations on which batch to buy.

By the use of a isoelectric focusing technique developed at URI, we are able to determine the geographical origin of the brine shrimp cysts and detect mixed samples. By improving the quality of the brine shrimp, the survival of the postlarval shrimp will increase and the production and hence foreign earnings will increase.

4. URI food science personnel have an ongoing commitment to take part in the instruction program at ESPOL. This lab has conducted training for hatchery workers, and we have lectured at these sessions. Also the Artemia Reference Center (ARC) in Gent, Belgium has conducted training courses for international fishery biologists. We have given the lectures on the biochemistry of the brine shrimp at these training courses at the ARC.

5. At an aquaculture conference in Poland in the mid 1970s, an informal group was organized and given the name International Study of Artemia. The purpose of the group was to bring together a small group of scientists conducting research in the different aspects of brine shrimp production. Some 40 publications, 2 international conferences and 8 conferences have been coordinated by this group. The impact of this group has been far reaching as it has coordinated projects funded by development agencies in different countries such as Ecuador, Brazil, Thailand, Philippines and Indonesia

Postharvest Fishery Losses (PHFL)

A training program entitled "Preservation of Fishery Products" was conducted at URI in 1984. Ten personnel from the regional and central offices of the Bureau of Fisheries and Aquatic Resources (BFAR) in the Philippines attended. They represented each of the seven Regional Fishermen Training Centers (RFTC). The impact of the course for these personnel is evident in the fact that they are leading in-country training of middle level and lower level personnel who are in charge of extension work that is currently reaching the fishermen themselves.

Publication of the international workshop proceedings from the Postharvest Fishery Losses Workshop will expose researchers in the field and administrators from LDCs to the newest and/or most effective techniques to reduce these losses. Furthermore a set of guidelines will influence the direction of research/projects in postharvest fishery losses in the future.

Sociocultural Aspects

A fishery training project monitoring and evaluation program which was implemented by the Bureau of Fisheries and Aquatic Research at all Regional Fishery Training Centers in the Philippines has resulted in a plan which not only uses adequate socioeconomic and fishing technology baseline data to select training projects, but monitors and evaluates the results of the training. The ICMRD social scientist helped set up the program, and has participated in several follow-up evaluations to determine impacts of specific trainings. In both Palawan and northern Luzon, the post-evaluation of training of marine fishermen indicates that those involved in training and/or adopting the technology have increased production, incomes, and household elaboration as indicated by a comparison of baseline and evaluation surveys.