The National Sea Grant College Program

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National Oceanic and Atmospheric Administration

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Introduction

The Sea Grant International Program (SGIP) was established in 1976 by Section 3 of the Sea Grant Improvement Act (P.L. 94-461). The program was intended as an international complement to the National Sea Grant College Program. Congress envisioned it as a means of transferring marine technology to the developing countries and fostering international cooperation in marine affairs. If developing coastal nations have the ability to explore, manage and exploit their own oceanic resources, it is expected that they will be more understanding, sympathetic and cooperative as we develop our own.

The goals of SGIP are (1) to enhance the research and development capabilities of developing foreign nations with respect to ocean and coastal resources, and (2) to promote the international exchange of information and data on the assessment, development, utilization and conservation of such resources. Developing countries are defined as those countries which are eligible for the Generalized System of (Tariff) Preferences.

In order to accomplish the two goals of SGIP, grants are awarded to U.S. academic institutions to support projects that are designed and carried out in cooperation with academic institutions in eligible developing countries. Emphasis to date has been on education and training projects, though not to the total exclusion of research or extension activities.

The first international grants were awarded by Sea Grant in 1978. By the summer of 1983, SGIP had been in existence for five years, twelve projects had been started or carried out in various parts of the developing world at a total cost of approximately $3 million, and it seemed a good moment to attempt to document the results of the initial projects. Thus this report. The purpose of this report is to summarize what was accomplished by the international projects, what benefits accrued to the participants, and what lessons were learned that may be useful in the future.

A few words on methodology may be helpful. In June 1983 a questionnaire was sent from the Office of Sea Grant to each Sea Grant Program that had had an international project. The questionnaire asked about accomplishment of the two program goals stated above, accomplishment of project objectives, benefits to participants, developing country partner's contribution to the project, management flexibility in carrying out the project, and lessons that had been learned. The full questionnaire is Appendix A to this report.

Response to the questionnaire was quite good. Eight completely filled out and useful responses were received in the Sea Grant Office. One final technical report was so timely and complete that the principal investigator was not asked to fill out the questionnaire; rather, his report was used in

constructing the questionnaire itself. Another project had to end when the principal investigator changed institutions and moved to private industry; no useful response could be expected in this case. One questionnaire was completed in the course of a long telephone interview. Only one program failed to provide any response.

In the summary of 1983, one of us (T.D.E.) interviewed a large number of the participating Sea Grant Directors and principal investigators by telephone, going well beyond the questionnaire to questions such as adequacy of funding, barriers to project success, relationships among U. S. and developing country academic institutions, likelihood of long term benefits once funding comes to an end etc.

Additional information was obtained from technical reports on completed projects and from earlier annual reports on SGIP.

In the interests of factual accuracy, copies of this report were made available to participants in SGIP projects, and their comments and suggestions influenced its final content. Matters of opinion are, of course, the sole responsibility of the authors.

Summaries of the SGIP projects are contained in Appendix B.

Some History

Before getting into the details of program results, it may be helpful to briefly review the history of the Sea Grant International Program (SGIP). Seven projects were funded in FY78, four of them for two years and three for one year. All the projects put primary emphasis on education and training of developing country personnel. Both U. S. and foreign personnel participated in the design of the projects. Each project was university-based to as large an extent as possible. In each case, the project was built upon some pre-existing relationship between institutions. Five of the original seven projects involved institutions in Latin America.

In FY79, the second year of the program, another seven grants were awarded for support of international projects. Three of the grants were for continued support of ongoing projects, while four were for new ones. Three of the grants were for projects in Latin America. In FY80, six grants were awarded, five of them for continued support of ongoing projects. Three of these projects were in Latin America. *In* FY81, two grants were awarded for completion of ongoing projects; *no* new projects were started. Table I shows grantee institutions, participating developing countries, project durations, and cumulative project funding for all the international projects.

In January 1981, after three years of awarding grants to universities under SGIP, and after approximately two years of actual project activities in developing countries, a meeting was held of principal investigators, staff members from the Sea Grant Office, Sea Grant Directors, and one member of the National Review Panel to discuss the progress of the international program. The meeting was held on the Scripps campus of the University of California, and it was followed by a visit to some of the Mexican institutions involved in the University of California international project. The subject of program evaluation was discussed at some length at the meeting. It was generally

agreed that you can tell whether or not the objectives of a particular project have been carried out. It is much harder to determine the extent to which accomplishment of project objectives adds up to accomplishment of overall program goals. Participants at the meeting recommended that investigators write up case histories of their individual international projects to show how project objectives had been achieved and how project objectives had to be altered to meet changing circumstances. These case histories were received from all the ongoing international projects. They were not evaluations in any sense of the word, but they were intended to fill a gap until something more formal became available. A number of other recommendations were made at the LaJolla meeting, and a report on the meeting is available on request.

In 1982 a subcommittee of the Ocean Policy Committee of the National Academy of Sciences published a report entitled "Marine Technical Assistance to Developing Countriues: The U. S. Role." This report contained a preliminary evaluation of SGIP. It stated:

> "Several key elements have contributed to the effectiveness of the Sea Grant International Program as a mechanism for institution building. First, education and training of developing country personnel are integral parts of each project. Second, projects are developed on an institution-to-institution basis rather than a government-to-government basis. Third, as a result of this form of project development, there is an absence of unnecessary administrative intervention and bureaucratic delay. This allows principal investigators administrative freedom in carrying out their projects while providing necessary program accountability. Endorsement of SGIP from developing nations and the U. S. marine science community suggests that the program has been a success." (Marine Technical Assistance to Developing Countries: The U. S. Role, page 38.)

By judicious expenditure of grant funds and use of developing country contributions, several investigators were able to extend their international projects beyond the estimated completion dates. At this time (March 1984) all international projects have come to an end.

TABLE I

SGIP Projects

Grantee Institution	Developing Country	Cumulative Duration *	Cumulative Funding
U. of Hawaii	South Pacific Nations	4 years	$ 288,500
Oregon State U.	Chile and Mexico	6 years	492,500
U. of California	Mexico	4 years	240,000
Florida S. G. Program	India	1 year	19,300
Louisiana State U.	Mexico	5 years	111,200
Maryland S. G. Program	Egypt	3 years	134,400
U. of Rhode Island	Malaysia	5 years	379,900
New York S.G. Institute	Chile	3 years	72,000
U. of Delaware	Costa Rica	5 years	623,500
VIMS/South Carolina	Israel	3 years	148,800
U. of Miami	Columbia	4 years	311,500
Lehigh University	India	1 year **	31,754
		TOTAL	$ 2,853,354

* Includes no-cost extensions of grants.
** Project terminated prematurely.

Analysis of Responses

As mentioned above, the chief sources of information for this report were a questionnaire, telephone interviews and technical reports. All of this information is presented below in the format of the questionnaire.

Program Goals. All of the principal investigators reported strong contributions toward accomplishing the first goal of the international program, i.e., to enhance the marine research and development capabilities of developing countries. Investigators at the University of Rhode Island, for example, worked with faculty members at three Malaysian universities to upgrade their capabilities in research, teaching and extension methods. The principal subjects of emphasis were fisheries research and management, economics and marketing, and mangrove ecology. A short project involving the University of Florida and the Indian Institute of Technology at Bombay trained a number of Indian engineers in the design and maintenance of small fishing harbors. As a final example, investigators from John Hopkins University in the Maryland Sea Grant College Program strengthened environmental microbiology and pollution monitoring capabilities at the High Institute of Public Health in Alexandria, Egypt. In summary, the international projects showed how strong institution-to-institution ties are an effective avenue for enhancing the marine research and development capabilities of institutions in the developing world.

Evidence for accomplishment of the second goal, i.e., to promote the international exchange of marine information and data, is real but less definitive than for the first goal. Every international project to date has included provision of scientific publications to colleagues in developing countries. In some cases, this led to the shipment of literally tons of journals which are not needed here but which can supplement library holdings in other countries. But it is not clear how many colleagues in developing countries can participate in the normal information and data sharing arrangements that exist elsewhere, especially after grant funding has ceased.

Project Objectives. With the sole exception of the project which was ended early, all international project investigators were successful in accomplishing the objectives they had set for themselves. Most investigators also found they had to modify their objectives in the course of the projects. Oregon State University faculty members, for example, continued cooperative training programs that were already in existence at several Chilean and Mexican institutions and helped Latin American institutions purchase, maintain and use oceanographic research equipment. But they also found an oyster culture training course had to be abandoned when oysters from North America could not be imported into Chile. On the other hand, they were able to add an unplanned workshop on use of audio-visual methods by extension personnel. As a second example, the University of Hawaii was successful in training Pacific Islanders at the University of the South Pacific as marine extension agents, giving each one some training in general extension techniques as well as some special skills. Follow-up training could not always be pursued however, since some of the newly trained agents went off into other fields of endeavor. Finally, investigators in the University of Delaware-University of Costa Rica project were able to carry out chemical and physical oceanographic training and research in addition to the proposed biological work.

Benefits. All projects reported substantial benefits to participating developing countries and their academic institutions, especially in education and training. Investigators at the University of Miami, for example, reported that a large number of Columbian students (about 30) and other professionals (about 20) received training of some kind during the project. The students used project data for their theses, and seven of them have already received degrees in marine fields of study. The University of Florida-Indian Institute of Technology project was helpful to the Indians because it fit so well into the Indian government's fisheries development plan. The University of Delaware-University of Coasta Rica project has provided Costa Rica with a cadre of trained marine scientists who are likely to be prominent in their fields in the years ahead. As a result of the Sea Grant International Program, we estimate that at least 330 scientists and students in developing countries have received additional training in marine fields of study.

Benefits to the U. S. and its academic institutions have been quite real but also somewhat harder to specify. Investigators from the University of California international project in Mexico reported, for example, that "U.S. marine scientists working in Mexican waters have established collegial relationships which are sensitive to the national and cultural aspirations of Mexican scientists. This is essential to any future work in Mexican waters since the Mexican government has made it clear that Mexican territorial seas will not be intruded upon by scientific vessels unless there is clear benefit to Mexico." As a second example, the University of Hawaii wrote "This program was beneficial to the U. S. by having our nation represented in developing countries in a benign academic atmosphere (i.e., not as a program wrapped in the American flag with strong doses of U. S. government representation). This was important because of the very negative reaction to the U. S. government recently expressed by most Pacific Island nations due to our EEZ policy as related to the management of tuna, and by lingering reaction to our nuclear testing programs." As a final example, Oregon State University reported that its international project facilitated data exchange and cooperative research with Latin American institutions.

Several investigators identified benefits to the National Sea Grant College Program. Oregon State reported "Sea Grant is becoming favorably known worldwide through this very small but effective international arm. The Sea Grant approach is unique and intriguing. There may be counterparts developing as the program moves along."

Finally, both the questionnaire and the telephone interviews provided examples of how Sea Grant's International Program has promoted broad national goals of the United States. In this era when freedom of oceanic research is declining, for instance, the program has helped build cooperative relations and maintain access to do research in the territorial waters of other nations. The program supported cooperative projects in strategic, economically important and politically sensitive areas of the globe such as Central America and the Middle East. By training developing country nationals, the program has increased understanding of our own activities as we endeavor to explore and develop the resources of our Exclusive Economic Zone.

Developing Country Contribution. A recurring question has been: What have the developing country partners contributed to the international program? We estimate, principally on the basis of answers to our

questionnaire, that developing country contributions have been only slightly less than the U. S. contribution. Developing countries' contributed support has manifested itself in all kinds of things, ranging from local travel expenses and lodging for U. S. investigators to interpretation services, use of laboratories, ship time and computer use. Most of this contribution has been in kind rather than in cash, but that does not make it any less real. Malaysian institutions, for example, supported seven Malaysian faculty members in studies at the University of Rhode Island as part of an international project; and MAJUIKAN (the National Fisheries Development Company of Malaysia) provided funds to two universities for research activities connected to the University of Rhode Island's international project. The principal investigator of the Louisiana State University project in Mexico reported that Mexican institutions provided boats, gasoline, vehicles, laboratory space and equipment, housing for visiting scientists, secretarial help and supplies. All in all, the high level of foreign contributions is encouraging, especially since the entire burden of support has fallen on them in the last couple of years. Sea Grant now has to devote all its resources to its matched grant domestic program and has no funds available for support of unmatched international activities.

Flexibility. Sea Grant Directors were asked whether or not their investigators had sufficient flexibility to respond effectively to changing circumstances and unanticipated needs. Every respondent answered affirmatively. Oregon State University, for example, wrote: "In a program of this nature, flexibility is essential because conditions (political, economic, and social) can change rapidly in Latin America (and other) developing countries. This is especially true during the present period of world economic stress. We cannot set the pace for our foreign colleagues; they must do that themselves. We need flexibility in timing projects and altering goals and objectives. International Sea Grant seems to have recognized this need more than other international aid programs."

Lessons Learned. The questionnarie asked: If you had it to do over, what would you do differently? Responses ranged all the way from the simple declaration "I would do it the same way" to fairly long descriptions of things which could have made the projects better or more effective. Investigators at the University of Miami, for example, stated: "Experience showed that over the 3-year duration of this project a much greater percentage of time over that budgeted was devoted by University of Miami participants to this overseas activity. Additionally, as mentioned in previous reports, a small proproposal planning grant would have been useful because of the types of difficulties encountered in developing programs in the field; such a grant would have avoided or minimized at least 4-6 months of frustration and delays at the start of the Cartagena Bay study, especially those related to provision of a launch for biological sampling." Several respondents remarked that more time for long range planning and coordination would have been very helpful.

Summary and Conclusion. To summarize our findings, the Sea Grant network of academic institutions showed -- on a pilot basis -- what they could do to enhance marine research and development capabilities in the developing world. The total U. S. budget for this effort was under $3 million, while developing country partners contributed somewhat less than that amount. Benefits were well distributed among the participants in international projects. And there is preliminary evidence that the results of the projects will outlive the projects themselves.

The International Program was an experiment and, so far as we can tell, the experiment was a success. The program had to be suspended because of lack of funds. But the Sea Grant institutions are prepared to start again as soon as it becomes feasible; and, in fact, a couple of institutions are already supporting low levels of international activities as part of their matched grant programs. These results are, in our judgment, a vindication of the legislation which established the Sea Grant International Program.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852

NATIONAL SEA GRANT COLLEGE PROGRAM

JUN 1 0 1983

To: Sea Grant Directors with International Projects

From: Ned A. Ostenso

Subject: Sea Grant International Program

The Sea Grant International Program (SGIP) has been in existence for six years. During that time, twelve projects have been carried out in various parts of the developing world at a total cost of approximately $3 million. Some of the projects have been completed, and I expect the remaining ones to come to an end sometime in the next few months.

This is a good moment to document the results of the initial twelve projects. A study of SGIP can be useful at this time in order to summarize what has been accomplished, what benefits have accrued to the participants, and what lessons have been learned. It could also help us prepare for a re-invigorated international program when this becomes possible.

I have asked Tom Murray to carry out this study with the assistance of a summer intern here in the Sea Grant Office. The study will done in coordination with Bud Rock who continues to have management responsibility for ongoing international projects.

I would be grateful if you would complete and return the attached questionnaire by June 30. Copies of your project summary form and most recent case history or progress report are enclosed. They may serve as a starting point in completing the questionnaire.

SEA GRANT INTERNATIONAL PROGRAM

Sea Grant Institution: _____

Title of International Project: _____

_____

Person Completing This Form: _____

(1) Program Goals.

To what extent did your project enhance the marine R&D capability of a developing country?

To what extent did your project promote the international exchange of marine information and data?

(2) Project Objectives.

(Your project objectives are given on the accompanying project summary.)

Were objectives added to (+) or deleted from (-) your original project? _____

If objectives were added or deleted, why? (Please use extra sheet if necessary.)

(3) Accomplishments.

Were the original objectives met? (Y/N) _____

Were any additional objectives met? (Y/N) _____

Comments? (Please use extra sheet if necessary.)

(4) Benefits.

(Anticipated benefits are given on the accompanying project summary.)

What benefits have been identified to date

a. To participating developing country?

b. To its academic institutions?

c. To the United States?

d. To your institution?

e. To the National Sea Grant College Program?

(5) Developing country contribution.

What monetary or in-kind matching contribution did participating developing country make to your project?

(6) Flexibility.

Did the investigator have sufficient flexibility to respond effectively to changing circumstances or unanticipated needs? _____

Comments? (Please use extra sheet if necessary.)

(7) Lessons learned.

If you had it to do over, what would you do differently?

APPENDIX B

PROJECT SUMMARIES

TITLE OF PROJECT:	Marine Resources and Environmental Sciences Training and Information Exchange for Colombia
GRANTEE INSTITUTION:	University of Miami
DEVELOPING COUNTRY:	Columbia
DEVELOPING COUNTRY INSTITUTIONS:	Colombian Oceanographic Commission, Institute for the Development of Renewable Natural Resources, the Hydrographic and Oceanographic Research Center, the University of Bogota, the University of Cartagena, the University of the Andes, and the National University of Colombia.
SIZE AND DURATION OF GRANT:	$311,500 for three years
PRINCIPAL INVESTIGATOR:	Frank Williams
DEVELOPING COUNTRY LIAISONS:	Capitans G. Angel Mejia, A. Martinez Barbosa and J. Sanchez Cortez
FOREIGN CONTRIBUTIONS TO THE PROJECT:	Payment of air fares and per diem for training course attendees, provision of instructors and logistical support, provision of launches and crews for hydrodynamical and chemical sampling programs and the technical staff for laboratory processing of samples plus use of equipment
GENERAL OBJECTIVE:	To enhance the capability of Colombian scientists to handle environmental and marine resource problems in the coastal zone
SPECIFIC OBJECTIVES:	(1) To provide a series of lectures on the principles of multidisciplinary marine research and environmental studies of tropical coastal areas such as Cartagena Bay, as well as using case histories from other applicable areas; (2) To provide on-the-job training in the design, planning, execution and coordination of field and laboratory programs to provide the data base necessary for development of management plans for coastal environment and resources, through a broad scale integrated study of Cartagena Bay.

The University of Miami initiated a cooperative training program in Colombia in 1978. This project, completed in August, 1982, sought to enhance the capability of Colombian scientitst and technicians to better deal with resource and environmental problems of their coastal zone. Frank Williams, project PI, stressed an integrated approach to cooperative assistance through both educational and research activities. Undergraduates and professors first learned estuarine hydrodynamics, chemistry of sea water and pollution, marine biology/ecology, etc. in lectures and seminars, and then were taught to apply their knowledge in the field. A broad scale, multidisciplinary study of Cartagena Bay fused the theoretical with the practical in a collaborative research effort.

This training and information exchange program with the Colombian cadre of marine oriented scientists served to establish a trained, proficient nucleus of scientists and technicians. They are now capable, with minimum external assistance, of investigating and solving other resource and environmental problems in that country. In addition, the report of the joint study of Cartagena Bay made during the training program is available for use by Colombian officials in development of management plans for the Bay. Any future consideration of the state of Cartagena Bay, in terms of environmental quality, must now recognize that natural baseline conditions include a marked and previously undetected seasonal cycle in physical and chemical parameters with resultant effects on the biota.

This project met explicit, identifiable needs of the Colombian marine science community and its impacts will be lasting. Miami scientists had been involved for two years prior to the project in matters related to the apparent increasing degradation of the environment and resources of Cartagena Bay. U. S. assistance was called for by Colombian authorities as it was clear that local studies had been inadequate, poorly planned and executed, and lacked the coordinated approach needed for development of a management plan for the Bay. Frank Williams developed the project as a means of directly addressing a specific problem, while simultaneously meeting broader education needs in Colombia.

TITLE OF PROJECT:	University of the South Pacific/University of Hawaii Sea Grant International Cooperative Program
GRANTEE INSTITUTION:	University of Hawaii
DEVELOPING COUNTRY:	Pacific Islands (Solomons, Fiji, Tuvalu, Kiribati, Vanuatu, Cook Islands, Nauru, Niue, Tokelau, Tonga, and Western Samoa)
DEVELOPING COUNTRY INSTITUTION:	University of the South Pacific
SIZE AND DURATION OF GRANT:	$ 288,500 for three years
PRINCIPAL INVESTIGATORS:	Philip Helfrich and Jack Davidson
DEVELOPING COUNTRY LIAISON:	Dr. U. Raj., Director, Institute of Marine Resources, USP
FOREIGN CONTRIBUTIONS TO THE PROJECT:	In-kind matching contributions to cooperative research training efforts and training of individual extension agents. In each of the joint conferences UH conducted, the participating country (usually Fiji) also made direct monetary contributions.
GENERAL OBJECTIVE:	To assist the University of the South Pacific's Institute of Marine Resources develop an advisory network. Also to exchange talent, information, and ideas between the University of Hawaii and USP using faculty exchanges, the PEACESAT, and other means.
SPECIFIC OBJECTIVES:	(1) To conduct a joint faculty exchange between USP and the University of Hawaii (UH) to achieve improved tropical marine science course offerings and overall professional improvement within the universities; (2) To establish a functional marine extension service with offices at the University of the South Pacific's Institute of Marine Resources and other USP regional centers; (3) To assess the program and develop a follow-up plan to complete the advisory network and professional improvement programs.

The Hawaii project was successful in that it accomplished both goals of SGIP. The project directly enhanced the marine R&D capability of several countries served by USP: Fiji, Cook Islands, Kingdom of Tonga, Republic of Kiribati, Solomon Islands, and Western Samoa. In an indirect manner it improved the understanding of marine resources and their management in all eleven Pacific Island countries served by USP through conferences, information

exchange and improved course offerings. International exchange of marine information and data was promoted by sixty-eight one-hour conferences on PEACESAT (Satellite Communication System) involving more than eighty individuals from twelve countries. This system created a networking of information among the Pacific Island Nations and UH and served as a rapid response mechanism concerning problems and requests.

Through UH efforts, six Pacific Islanders were trained as marine extension agents in general extension techniques as well as special skills (environmental assessment, snapper fishing, prawn culture, bait fish culture, etc.) Not all are working as extension agents full time, but all are in some aspect of marine education, training, management of resources, etc. The following offers two specific examples of this aspect of the project: Johnson Seeto, a native Fijian, worked on a deep water snapper project and has done consulting work on a number of small contracts with agencies in the South Pacific. Papers have been published as a result of his work. Additionally, he has become skilled in rapid environmental assessment which is extremely important in the Island Nations where little long range planning is done. Holmes Saeve worked on a baitfish project for the Solomon Islands government involving their surface tuna fishery, a highly valuable natural resource. He has become an important man in fisheries and has a good chance of becoming director within the relevant Solomon Island Agency. Mr. Saeve and Mr. Seeto both came to UH for part of their training and Mr. Saeve was also able to attend an extension workshop at Oregon State University.

A variety of other benefits have been derived from this project. Wayne Baldwin, a biologist with the Hawaii Institute of Marine Biology, advised the Fiji government on a solution to a major constraint to the development of their tuna fishery. As a result of Baldwin's recommendations and assistance, the Fijians received a $250,000 grant from Australia to construct a bait culture facility. This facility will also be used as an international training site. Technology transfer projects using multidisiplinary teams of UH and USP personnel have been beneficial to the developing countries. Marine science curricula were improved at USP which should lead to strengthened marine science capability among students. This project provided valuable exposure of researchers to the problems of the developing Pacific Island Nations, and spread the name of Sea grant throughout this region. Significantly, it reflected positively on the U. S. in contradistinction to the very negative reaction expressed by most Pacific Island nations due to our policy on the management of tuna and by the lingering reaction to our nuclear testing programs.

TITLE OF PROJECT:	Strengthening Environmental Microbiology and Pollution Monitoring Capabilities at the High Institute of Public Health, Alexandria, Egypt.
GRANTEE INSTITUTION:	Maryland Sea Grant Program
DEVELOPING COUNTRY:	Egypt
DEVELOPING COUNTRY INSTITUTION:	High Institute of Public Health
SIZE AND DURATION OF GRANT:	$134,400 for two years
PRINCIPAL INVESTIGATORS:	Kazuyoshi Kawata, Acting Director, Division of Environmental Health Engineering, and Vincent P. Olivieri, Assistant Professor of Environmental Health Engineering, The Johns Hopkins University
DEVELOPING COUNTRY LIAISON:	Abdel Hadi El Molla, Professor and Head, Department of Microbiology, High Institute of Public Health, Alexandria, Egypt
FOREIGN CONTRIBUTIONS:	Travel for individuals to come to the U S. under the training program. Space was made available for the environmental microbiology laboratory and the individuals trained in the project will be supported to continue their work.
GENERAL OBJECTIVE:	To enhance the capabilities of the Egyptian microbiologists in environmental microbiology in marine environments.
SPECIFIC OBJECTIVES:	(1) To hold workshops on recent environmental microbiological techniques; (2) To train microbiology students in the tracer virus techniques in field research and monitoring; (3) To hold a seminar each year on environmental microbiological studies in tropical waters.

The Maryland Sea Grant Program initiated a SGIP project in 1979 that sought to enhance the capabilities of Egyptian microbiologists in environmental microbiology and pollution monitoring. The work was formulated to meet explicit needs at the High institute of Public Health in Alexandria, Egypt. Egypt, in light of its rapid industrialization, has been afflicted with detrimental sewage and wastes, and a decline in finfish and shellfish populations. Before this project, the nation lacked adquate training in pollution monitoring using microbiological techniques. As a result of the project, Egypt has scientists trained in this technique as well as a better overall capability to understand microbiological conditions and marine environments. Additionally, there was a detailed exchange of marine

microbiological information, training of the Egyptian counterparts in the U. S. on an exchange program basis, workshops held, and a lab was equipped for tracer virus methods for research and monitoring.

This project provided benefits not only to Egypt, but also to the U. S. Data on the incidence of pathogens, especially viruses in polluted environments, was obtained. These data were very useful in being able to correlate epidemics with incidence of viruses in the environment in this country. The Maryland Sea Grant Program now has extensive contacts with their Egyptian counterparts. Researchers were able to carry out new methods in an environment where the background level of microbial pathogens is very high, and extend the usefulness of several methods that had been used routinely in the laboratory.

TITLE OF PROJECT:	An Ecological Program for the Laguna de Terminos (Campeche, Mexico) with Special Reference to Fishery Resources and the Potential Impacts of Man
GRANTEE INSTITUTION:	Louisiana State University
DEVELOPING COUNTRY INSTITUTION:	Universidad National Autonoma de Mexico (UNAM)
SIZE AND DURATION OF GRANT:	$ 111,200 for four years
PRINCIPAL INVESTIGATOR:	John W. Day, Jr., Center for Wetland Resources, Louisiana State University
DEVELOPING COUNTRY LIAISON:	Dr. Alfredo Laguarda, Director of the Center for Marine Sciences and Limnology, UNAM
FOREIGN CONTRIBUTIONS TO THE PROJECT:	Boats, gasoline, vehicles, lab space and equipment, housing for visiting scientists, secretarial help and many different types of supplies. At UNAM expense, two students visited LSU for extended periods and a group of fishery scientists spent two weeks in Louisiana studying fishery methods, management and analysis.
GENERAL OBJECTIVE:	To improve Mexican capabilities for ecosystem analysis and coastal management
SPECIFIC OBJECTIVES:	(1) To continue a cooperative study with Mexican scientists of management topics associated with the shrimp fishery of Laguna de Terminos; (2) To transfer the programs and data of the hydrodynamic model developed during the work to Mexican counterparts, implement it on their computer, and train individuals in its use; (3) To continue to train students in field studies necessary to complete an ecosystem analysis.

The LSU project has significantly enhanced marine science capability at UNAM and promoted information exchange between the U. S. institution and its foreign counterpart. All aspects of the project were cooperative in nature and Dr. Day pursued research projects where the training of scientists and students occured through direct participation in the work. The capacity to solve resource problems was approached through specific techniques (e.g., hydrodynamic model and fishery models) and overall guidelines (e.g., coastal management guidebook). Also, a shrimp management package was developed with personnel trained in the approach.

As a direct result of this project, a number of Mexican scientists have participated in scientific meetings and conferences outside of Mexico, and a number of papers have been published in international journals. There has also been an active scientist exchange program between the U. S. and Mexico stimulated by this project. At least 20 U. S. scientists have participated in the cooperative program, most providing their own support. An equal number of foreign researchers have spent professional time in the U. S. Additionally, both U. S. and foreign students earned their M.S. or Ph. D. degrees due to the work done in Mexico.

Because of the high degree of cooperation between LSU and UNAM, and the committment by UNAM of significant resources, this project was able to achieve all of its objectives. The standing of marine scientists of UNAM in the international scientific community has been enhanced by LSU's joint effort, as well as that of LSU as a center for Latin American activities.

TITLE OF PROJECT:	Joint University of Costa Rica/University of Delaware Marine Studies Program
GRANTEE INSTITUTION:	University of Delaware
DEVELOPING COUNTRY:	Costa Rica
DEVELOPING COUNTRY INSTITUTION:	University of Costa Rica
SIZE AND DURATION OF GRANT:	$ 623,500 for four years
PRINCIPAL INVESTIGATOR:	William S. Gaither
DEVELOPING COUNTRY LIAISON:	Manuel Murillo
FOREIGN CONTRIBUTIONS TO THE PROJECT:	Undisclosed amount of money was available from the Organization of American States through the University of Costa Rica
GENERAL OBJECTIVE:	To train UCR students, faculty and staff in a number of scientific and technical areas through a joint research program.
SPECIFIC OBJECTIVES:	(1) To initiate a well planned joint UCR-UD preliminary assessment of commercial and megabenthic invertebrates of Golfo de Nicoya and begin to compile solid knowledge about Costa Rica's marine resources; (2) To provide a well equipped, modern, versatile and economical research vessel as a platform from which to do research and which can also be used by UCR as a training platform for research vessel crews, oceanographic technicians and marine studies students at graduate and undergraduate levels; (3) To continue the exchange of personnel between UCR and UD especially for graduate and technician training; (4) To provide the UD as a model, based on its Sea Grant college and University National Oceanographic Laboratory System (UNOLS) status, as one approach to developing marine studies expertise and capability in an academic institution.

The project initiated by the University of Delaware emphasized cooperative education and training within the context of a joint research project. The training of UCR students, faculty, and staff in a number of scientific and technical areas was carried out and the project provided UD faculty and students with a unique opportunity to study a tropical ecosystem.

the Gulfo de Nicoya. Through the joint UD-UCR work, a large data base for the water body was developed. Chemical, biological and physical studies were conducted to determine the base-line ecological conditions in the Gulf. The chemical work resulted in definition of chemical conditions in the upper and lower Gulf and in the establishment of a simple water quality lab at UCR.

As part of the physical work, UCR personnel were trained in the use of basic oceanographic equipment. Similar equipment was subsequently purchased by UCR and is presently used by their personnel on a weekly basis. The biological work allowed quantification of benthic invertebrates and fishes from over twenty sampling areas in the Gulf. Additionally, UCR scientists were trained in remote sensing techniques, fishery management, pollution assessment, analysis of trace metals in organisms and basic fishery biology. Changing patterns of land use around the Gulf were monitored using remote sensing techniques; seasonal changes in the quantity of benthic life in certain areas were correlated with relative pollution levels; and the effects of pollution on the reproductive processes of potential commercially important species in the Gulf was addressed.

Through this project, two UCR students earned their M.S. degrees at UD and returned as UCR faculty members. In addition to their research activities, these young scientists selected highly qualified UCR undergraduates to serve as assistants in their project. Two UD students were also able to earn their masters degrees and produced theses in tropical ecology. A total of thirteen additional papers were or will be completed due to this cooperative effort in marine assistance. Throughout the project, the UD research vessel R/V Skimmer was used as a platform from which to do the research. As a particularly unique aspect of the project, Rolando Hoffmeister began as an apprentice boat captain in 1978. This young man had graduated from UCR with a B.S. in marine biology and received extensive training from UD captains. He is now certified as a captain for the research vessel and, additionally, an oceanographic technician was trained to serve on the crew of the boat.

This project has produced significant benefits to all involved. Costa Rica now has a trained cadre of marine scientists and technicians that have added significantly to its marine science capability. The preliminary ecological assessment of the Gulfo de Nicoya, while not yet applied to management, provides a sound data base to work with when it becomes appropriate to put it to use. UCR-UD insitutional ties have been strengthened and UD already has formulated another proposal to continue their work in Costa Rica.

TITLE OF PROJECT:	Improvement and Application of Ocean Wave Data Acquisition and Modeling Techniques for the Facilitation of Coastal Zone Management Decisions in Israel and the United States
GRANTEE INSTITUTION:	VIMS/University of South Carolina
DEVELOPING COUNTRY:	Israel
DEVELOPING COUNTRY INSTITUTION:	Israeli National Oceanographic Institute
SIZE AND DURATION OF GRANT:	$ 148,800 for two years
PRINCIPAL INVESTIGATOR:	Victor Goldsmith
DEVELOPING COUNTRY LIAISON:	
FOREIGN CONTRIBUTIONS TO THE PROJECT:	Direct contributions by I.N.O.I. involved a computer programmer (25% time), a Ph. D. level student (100% time), maintenance of a directional wave instrument, and computer time. This amounts to approximately $25,000/yr. There were a variety of institutional services rendered. Other institutions contributed their manpower, data, various services and knowledge at no charge. These included Israel Port Authority, Ben Gurion University, and the Technion University Coastal and Marine Engineering Institute. Additionally, the project was coordinated with other funded projects to mutual benefit, most specifically the Scripps ONR program, and the joint Israel/Egypt/U.S. AID program.
GENERAL OBJECTIVE:	To strengthen the marine research and development capabilities of Israel as well as those capabilities within the South Carolina Sea Grant Consortium.
SPECIFIC OBJECTIVES:	(1) Maintain a wave gauge at Dado Beach, south of Haifa; (2) Analysis and integration with the wave data from Ashdod; (3) Application to specific projects in Israel for improved coastal zone management; (4) Improvement in the South Carolina Sea Grant program can be expected through interaction with the Israelis' exposure to a greater spectrum of research.

This project was designed to strengthen the marine research and development capabilities of Israel. In the course of the project, the PI transfered from VIMS to the University of South Carolina and the grant was transferred so he could continue his work. The general objective was accomplished by concentrating efforts in the specific area of wave information, which is basic to all coastal planning, and thereby improving overall advisory service capabilities in both Israel and the U. S. The project can be considered successful in that it provided applicable methodology for wave information gathering, processing, and dissemination. Training and education of Israelis at a variety of scientific, technical and advisory service levels was carried out.

Implementation of project objectives occured through (1) direct involvement in planning and program implementation by all Israeli groups concerned with wave data acquisition; (2) visits of six Israeli scientists and technicians to VIMS in 1979; (3) technology transfer to Israel and "on-the-job" training in Israel with the guidance of the PI; (4) data collection, synthesis and analysis; (5) preparation of a wave Atlas (and related reports) of the area for proper information, dissemination and use; and (6) application and enhancement of advisory service functions. Additionally, a strong infrastructure was left among several Israeli agencies and groups to insure a continuation of effort. Two-way exchange of basic research information was also promoted in that the Israeli coast has the same "mix" of wave data as the U. S. coasts. Thus, the required manipulations and techniques, which have been documented and reported, have provided input directly to the National Sea Grant College Program.

Specifically, a number of accomplishments and benefits were derived from the project. All existing wave data in the southeastern Mediterranean region have been acquired, digitized and stored on a computer in Haifa, Israel. All available data have been transposed into significant wave heights and periods, azimuth directions, and monthly time intervals. This was a major task and the problems encountered greatly enhanced the education and experience of the Israeli participants. The experience gained can also be applied in other areas of the U. S. with a similar mix of wave information.

All wave variants had to be manipulated, thoroughly explored and compared before being integrated. The successful integration of all Israeli wave data required the full cooperation of three Israeli groups concerned with waves: the Coast Study Group of Israel Ports Authority, Coastal Engineering and Marine Research institute, and the Israeli Oceanographic Institute.

TITLE OF PROJECT:	Strengthening Marine Sciences Capabilities and Programs at the University of Concepcion, Chile
GRANTEE INSTITUTION:	New York Sea Grant Institute
DEVELOPING COUNTRY:	Chile
DEVELOPING COUNTRY INSTITUTION:	University of Concepcion
SIZE AND DURATION OF GRANT:	$ 72,000 for three years
PRINCIPAL INVESTIGATOR:	I. W. Duedall
DEVELOPING COUNTRY LIAISON:	L. A. Chuecas
FOREIGN CONTRIBUTION TO THE PROJECT:	Faculty time, university resources
GENERAL OBJECTIVE:	To strengthen marine sciences capabilities and programs at the University of Concepcion, Chile.
SPECIFIC OBJECTIVES:	(1) To train qualified faculty members of the Division of Marine Biology and Oceanography, (2) To supplement the teaching and research program at the Department of Marine Biology and Oceanography.

The foundations of this project included a strong working level relationship between the U. S. PI and his immediate foreign collaborator. Additionally, a Memo of Understanding between the two universities (SUNY and UC) was signed formally by the Presidents of the two universities. There have been explicit benefits and accomplishments derived from this project. Eight Chilean scientists from UC visited SUNY in a two year period. The most visible educational product was a M.S. thesis completed by Professor Arcos. Professor Arcos received his M.S. degree in August of 1981. His thesis, "The Role of Upwelling on the Phytoplankton Distribution Within the Bay of Concepcion, Chile," is a very important contribution to the physical and biological processes occuring in the Bay. This water body is very important to the economy of the city.

Accomplishments by SUNY scientists were quite varied. Products range from a M.S. thesis by Mr. Covell to the development of new work in seaweed research (with further funding by NSF) conducted by Dr. Brinkhuis and his Chilean counterparts. Short courses in small computer applications and marine instrumentation were given, and SUNY provided input to UC in the purchase of a specially designed hydrographic winch for use on its vessel the R/V LUND.

This project received support from a variety of funding agencies and was able to integrate all finances into a successful project scheme. The Memo of Understanding indicates the committment by both institutions to the furthering of marine science capabilities. Through this project Chile now has an enhanced ability to develop and carry out a strong coastal management program.

TITLE OF PROJECT:	A Short Course on Small Harbor Engineering in India
GRANTEE INTITUTION:	University of Florida
DEVELOPING COUNTRY:	India
DEVELOPING COUNTRY INSTITUTION:	Indian Institute of Technology, Bombay
SIZE AND DURATION OF GRANT:	$ 19,300 for one year
PRINCIPAL INVESTIGATOR:	A. J. Mehta
DEVELOPING COUNTRY LIAISON:	S. Narasimham
FOREIGN CONTRIBUTION TO THE PROJECT:	Financial assistance in conducting the course
GENERAL OBJECTIVE:	To conduct a short course for middle-level engineers concerned with implementing their country's master plan for improving large numbers of India's small and intermediate-sized ports, and constructing others.

The course was a rare accomplishment due to the fact that it could invite, under the umbrella of small harbor technology, 15 Indian and 4 foreign speakers to address 50 participants representing various groups. These groups included 31 harbor engineers from different major and minor ports of India, 12 from leading consulting companies and 7 from academic and other Governmental Institutions. The course provided a unique opportunity to impart knowledge and exchange information on various aspects of coastal and harbor engineering through foreign and Indian experts on a common platform. Many lecture topics were covered during the Short Course and the lecture notes were compiled and bound into three volumes. These were distributed to the participants as well as to other interested agencies to serve as a useful guide and reference in harbor engineering. In view of the great demand for these three volumes of lecture notes, there was a need for printing several extra copies to supply those engineers who could not participate in the course. At the end of the course a questionnaire with six questions pertaining to various aspects of the course was distributed among the participants. Responses were generally very positive and indicate the success of the course.

Long term effects of the Short Course may be enumerated as follows:

(1) Indian Institute of Technology, Bombay has established a rapport with foreign organizations as detailed below:

a) University of Florida

b) University of California, Berkeley

c) University of Trondheim, The Norwegian Institute of Technology

d) School of Engineering, Aristotelian University of Thessaloniki, Greece

The Indian Institute of Technology has expressed its hope that more useful exchange of information through experts, exchange of data and research programs may be initiated in the future.

(2) The forum provided an opportunity for exchange of technical knowledge as well as development and trends in harbor engineering through this course. This has brought to the attention of the participants the present state-of-the-art on the subject and has created an awareness and awakening of the practical problems and their solutions.

(3) IIT's involvement in the short-term course attracted the attention of all harbor authorities in India which resulted in a sudden increase in the strength of sponsored officers (engineers) to the postgraduate course in Dock and Harbor Engineering to 12. This is an all time high against an average strength of 6 to 8 per year in the past 15 years. This is mainly due to the publicity created conducting the course and illustrates the potential and the capabilities of IIT to bridge the gap between theory and practice in harbor engineering.

TITLE OF PROJECT:	Graduate Education in Geotechnical Ocean Engineering at the Indian Institute of Technology, Kanpur
GRANTEE INSTITUTION:	Lehigh University
DEVELOPING COUNTRY:	India
DEVELOPING COUNTRY INSTITUTION:	Indian Institute of Technology, Kanpur
SIZE AND DURATION OF GRANT:	$ 175,000 for two years
PRINCIPAL INVESTIGATOR:	A. F. Richards
DEVELOPING COUNTRY LIAISON:	Dr. Umesh Dayal
FOREIGN CONTRIBUTION TO THE PROJECT:	
GENERAL OBJECTIVE:	To educate graduate level engineering students in geotechnical ocean engineering.
SPECIFIC OBJECTIVES:	(1) To educate graduate-level, Civil Engineering students in how to design, construct, and test in the lab, and at sea appropriate equipment, plan and conduct engineering research, relate results of Indian research with research in other parts of the world, and synthesize results and prepare paper(s) for publications; (2) To establish a marine geotechnical data bank in India; (3) To develop specialized ocean engineering short courses in India; (4) To provide selected Indian faculty and graduate students with the opportunity of studying applicable courses and methods of teaching and to participate in labe and field research programs in the United States.

This project was not completed and was not able to fully realize its objectives. The principal investigator was able to spend only $30,000 on the project as he transferred from Lehigh University to a private concern.

TITLE OF PROJECT:	An International Sea Grant Program from Latin America (with Emphasis in Chile and Mexico)
GRANT INSTITUTION:	Oregon State University
DEVELOPING COUNTRIES:	Chile and Mexico
DEVELOPING COUNTRY INSTITUTIONS:	Catholic University of Valparaiso and other universities in Chile and Mexico
SIZE AND DURATION OF GRANT:	$492,500 for four years
PRINCIPAL INVESTIGATORS:	Victor T. Neal and William Q. Wick
DEVELOPING COUNTRY LILAISON:	Administrators at participating universities
FOREIGN CONTRIBUTION TO THE PROJECT:	About half the total cost of the program in the form of participants' salaries, local travel, housing and per diem for North American participants, field logistics, publication of conference and workshop proceedings, ship time, freight charges, and computer time.
GENERAL OBJECTIVE:	To assist Latin American nations in building their competence in marine resource conservation and development, and to increase the international exchange of marine information and data.
SPECIFIC OBJECTIVES:	(1) To improve the exchange of ideas, data, and technology between Latin American and U. S. institutions; (2) To increase interest in and support for marine projects within the participating countries; (3) To help establish educational and research programs within the countries; (4) To provide information on the latest U.S. research projects and results; (5) To demonstrate the benefits of marine science research; and (6) To broaden the horizons of U. S. professionals by giving them an opportunity to develop cooperative programs with foreign scientists.

Prior to the start of the Sea Grant International Program Oregon State University (OSU) had been involved in cooperative marine programs in Latin America for a decade. Consequently, the faculty at OSU had a good understanding of the needs and aspirations of Latin Americans and were well prepared for Sea Grant's International Program when it began in 1978. Right up front, OSU project managers told their foreign colleagues that they would be required to provide about half of the cost of the program. This made them commit sizeable resources in faculty time, travel, facilities etc. to the project and made them partners rather than participants.

An early step in the project was a conference at the Catholic University of Valparaiso on marine science and technology. This conference allowed Latin American and U. S. scientists to share the results of their research and to plan for future collaboration. It opened up opportunities for marine extension activities in Chile and helped stimulate the development of up-to-date curicula in marine resource management and ocean engineering.

The project has helped bring about a moderate but significant enhancement of marine R&D in Chile, Costa Rica, and to a more limited extent, Mexico. Promising young faculty members from several universities were helped to finish work toward Master's and Doctor's degrees. Two major conferences were held on fisheries and oceanography. There were workshops on extension methods in Chile and Mexico. And cooperative research among Latin American and U. S. scholars is continuing.

TITLE OF PROJECT:	Informational and Educational Assistance to Marine Science Institutions in Mexico
GRANTEE INSTITUTION:	University of California
DEVELOPING COUNTRY:	Mexico
DEVELOPING COUNTRY INSTITUTIONS:	Instituto Nacional de Pasca; Escuela Superior de Ciencias Marinas, Ensenada; Universidad Autonoma de Baja California; Centro de Investigaciones y de Educacion Superior de Ensenada; Centro de Investigaciones Biologiacas, La Paz; and Universidad Autonoma de Baja California Sur, La Paz
SIZE AND DURATION OF GRANT:	$240,000 for two years
PRINCIPAL INVESTIGATORS:	George Hemingway and Richard Schwartzlose
DEVELOPING COUNTRY LIAISON:	Administrators at participating institutions
FOREIGN CONTRIBUTION TO THE PROJECT:	Host institutions provided housing, local transportation and services to guest teachers and researchers, while sea Grant paid for straight travel. Host institutions paid most of the costs associated with faculty training. Joint research efforts were jointly supported. In order to encourage self support, a Mexican library was expected to show evidence of a subscription to a scientific publication before Sea Grant would help secure back issues.
GENERAL OBJECTIVE:	To establish cooperation among Mexican and University of California institutions to improve Mexican research and education capabilities in the marine sciences.
SPECIAL OBJECTIVES:	(1) To train a self-supporting, self-perpetuating cadre of marine research technicians for the Mexican marine science community. (2) To acquire reprints, volumes, and hard copies of documents and journals for the Mexican institutions; (3) To provide requested short-term courses to faculty and staff members of the Mexican institutions to upgrade and expand their teaching capacity; and (4) To provide upon request access to short-term intensive training through attendance at summer courses by faculty members of the Mexican institutions.

This project built upon pre-existing working relationships among people at the University of California, San Diego State University, the NMFS Southwest Fisheries center and a number of Mexican institutions. A total of 16 cruises were carried out on both U. S. and Mexican research vessels with partial support from the international project. Two Mexican and two U.S. institutions joined together in a Mussel-Watch program; fish egg and larva identification techniques and fecundity analysis methods were shared; over 120 short courses were held; and over 670 boxes of books, reprints and journals were shipped to institutions which could use them. A deep sea reversing thermometry laboratory was constructed and outfitted by Instituto Nacional de Pesca in Mazatlan with partial assistance from the Sea Grant project. There was data sharing in both directions. The International Project helped researcheers in U. S. and Mexican institutions generate about $819,000 in new research funds and $250,000 in new assistance funds.

A prime reason for success of this project was its truly cooperative nature. An extremely high level of commitment from institutions on both sides of the border was instrumental in building trust and a sound working environment. The Mexicans wanted to pull the project off just as much as their U. S. counterparts. Though the project has come to an end, a liaison office at Scripps continues to serve as a focal point for sharing information, fostering cooperative projects, and linking the two marine science communities together.

TITLE OF PROJECT:	Cooperative Development of Marine Resources Capability in Malaysia
GRANTEE INSTITUTION:	University of Rhode Island
DEVELOPING COUNTRY:	Malaysia
DEVELOPING COUNTRY INSTITUTIONS:	Universiti Malaya, Universiti Pertanian Malaysia, and Universiti Sains Malaysia
SIZE AND DURATION OF GRANT:	$379,900 for four years
PRINCIPAL INVESTIGATOR:	Harlan C. Lampe and Nelson Marshall
DEVELOPING COUNTRY LIAISON:	Faculty at the Malaysian Institutions
FOREIGN CONTRIBUTION TO THE PROJECT:	Over U. S. $100,000 for salaries, transport, and living allowances. Extensive professional time on research, education and training activities in both the U. S. and Malaysia. In addition, office space, secretarial services and use of computer time.
GENERAL OBJECTIVE:	To cooperate with peers at the three Malaysian universities in strengthening their capabilities to address and solve marine resource problems.
SPECIFIC OBJECTIVES:	(1) To train professionally qualified Malaysian economists in fisheries economics methods; (2) To improve the teaching of fisheries economics in the Malaysian universities; (3) To assess current economic conditions in the fisheries sector of the east coast of Peninsular Malaysia; (4) To strengthen university capability to handle responsibilities for instruction and research in fish population dynamics and to introduce the kinds of research basic to population management; (5) To work with Malaysian faculty members to develop research projects that will permit the role of mangroves to be determined and factored into the making of coastal management decisions.

Three major work areas were emphasized in the University of Rhode Island international project: (1) economics of artisan fisheries, (2) population dynamics and management of marine fisheries, and (3) coastal ecosystems in relation to fish production. The approach in this project was to create research partnerships which would make it possible for University of Rhode Island participants to become involved in the marine-related educational programs at the Malaysian universities. The investigators completed a number of studies that incorporated research, education and marine advisory services -- just as in Sea Grant Colleges in the United States.

Some of the projects carried out by the University of Rhode Island and Malaysian colleges involved the marketing system of Malaysian fisheries, the economics of artisan fisheries, fishing gear research, studies of trawl performance, stock assessment, and research on mangrove ecology. A number of faculty members from Malaysia spent considerable periods of time at the University of Rhode Island, and at least two of them obtained higher degrees at URI. MAJUIKAN (the National Fisheries Development Company of Malaysia) provided funding to two of the Malaysian universities for research activities connected with the Sea Grant sponsored work.