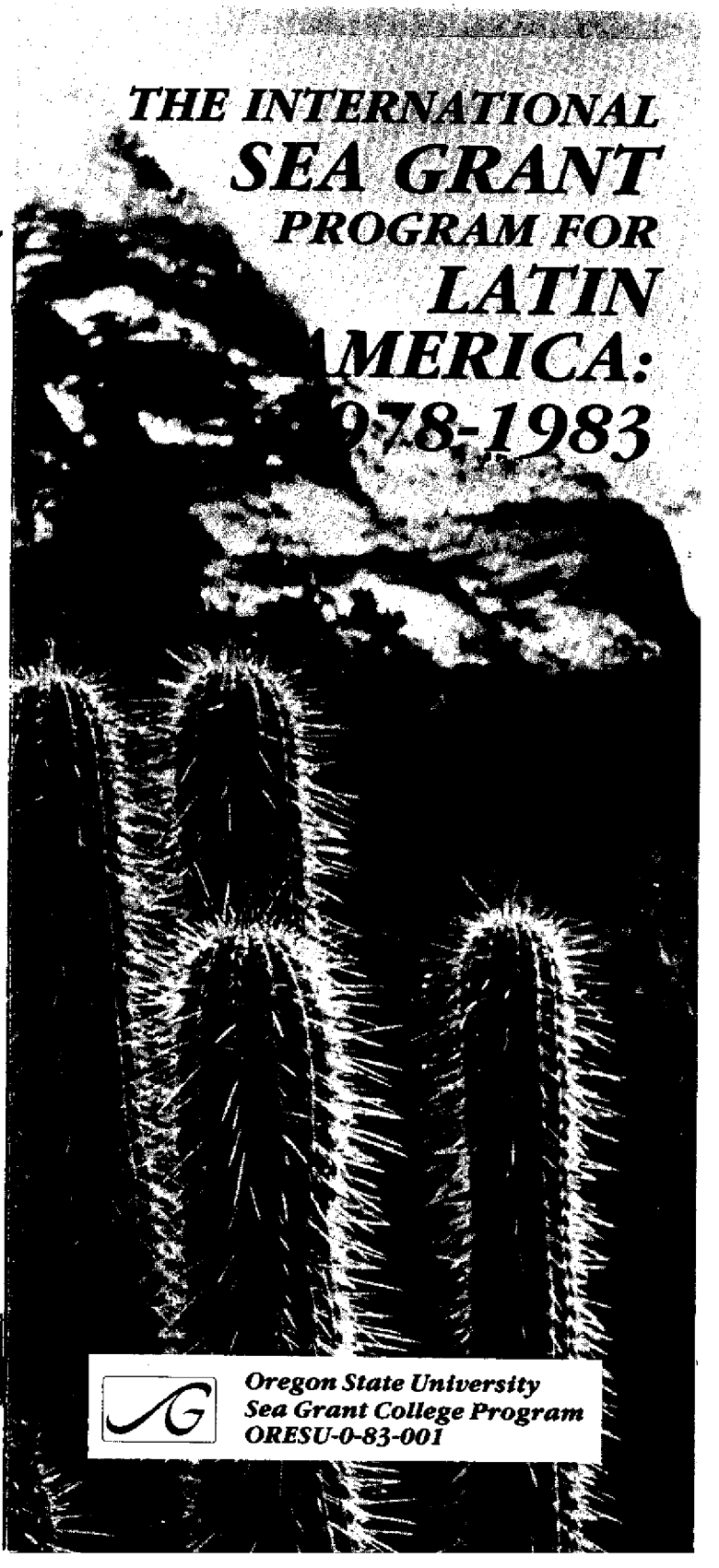
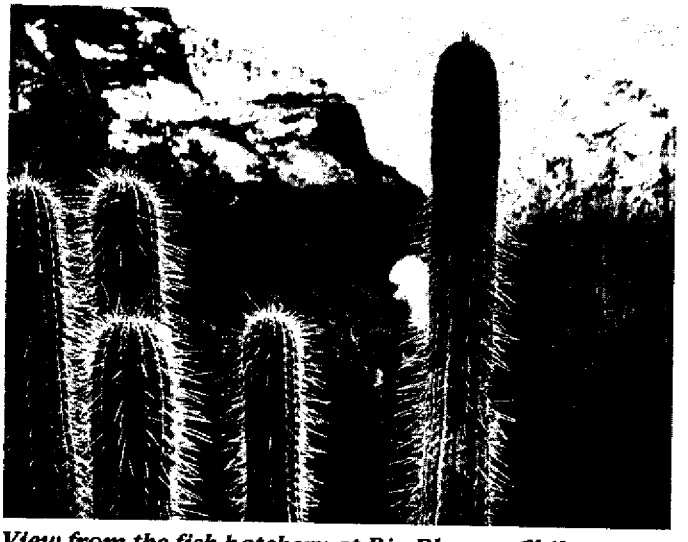


The Oregon State University Sea Grant College Program is supported cooperatively by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, by the state of Oregon, and by participating local governments and private industry.

THE INTERNATIONAL SEA GRANT PROGRAM FOR LATIN AMERICA: 1978-1983



View from the fish hatchery at Rio Blanco, Chile.

Victor T. Neal:

Oregon State University Coordinator
International Sea Grant Program
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Writer: Sandra Ridlington
Photos: Victor Neal, William Wick, and Thomas Gentle
Published: August 1983

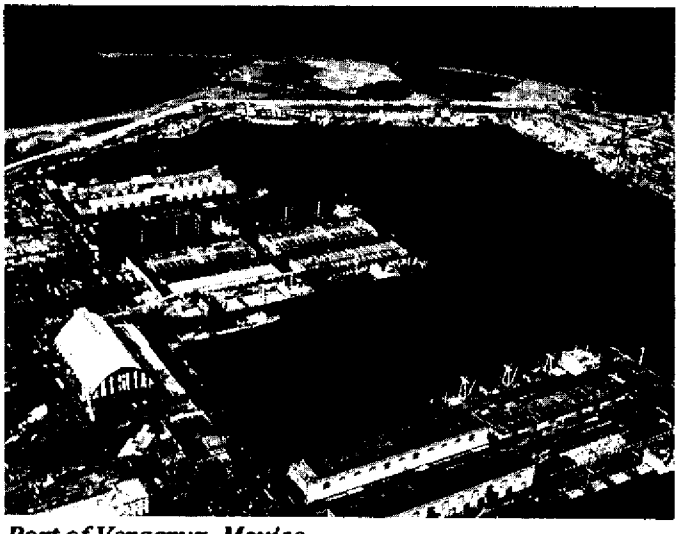
INTRODUCTION

In 1978, International Sea Grant agreed to fund a Latin American program whose roots were already well established at Oregon State University. The timing of Sea Grant's involvement could not have been more propitious. The International Southern Ocean Studies program (ISOS) was drawing to a close. One of the many long-term projects that made up the International Decade of Ocean Exploration Program, ISOS had been a vehicle through which U.S. scientists established contacts and exchanged data with Latin American scientists. No other significant support was available. Prospects were dimming for continuing the university's cooperative efforts with Latin American institutions. With Sea Grant support, OSU's Latin American program acquired the only substantial funding it had ever had.

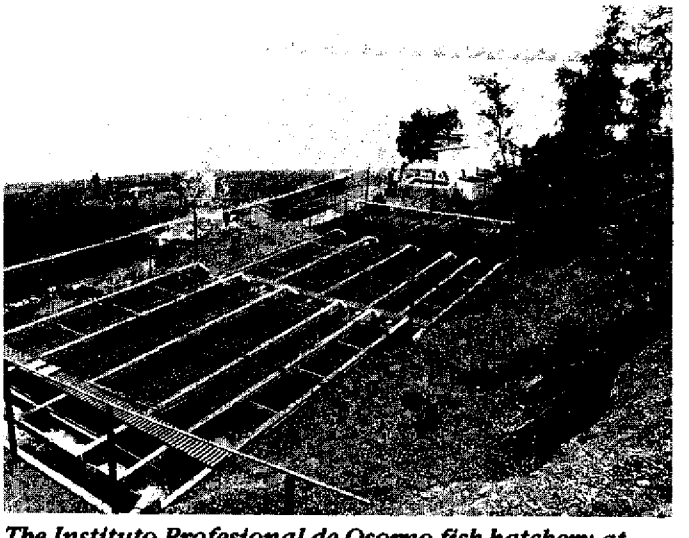
Even though financial support was irregular and often inadequate before the start of Sea Grant aid, OSU's involvement in marine matters in Latin American universities was long-standing. In the late 1960s and early 1970s, OSU oceanographers conducting cruises in the South Pacific and the Antarctic developed friendships with Latin American scientists and began visiting their institutions. These visits sowed seeds of cooperation between scientists from the north and south.

That both Latin American and U.S. marine scientists would benefit from cooperation was undeniable. Latin American institutions needed and requested U.S. expertise. Chile, for example, as one of the first countries to claim a 200-mile fisheries limit, had a pressing need for personnel trained in fisheries. And if the U.S. wanted to continue global ocean research, it would need logistic support for U.S. ships, the exchange of data, and perhaps even the use of Latin American research vessels. In short, the U.S. would need the goodwill of the Latin American marine community, and goodwill would require effort.

Besides opening up vistas of cooperation, the Latin American cruises and visits also instructed OSU personnel in the pitfalls of interamerican cooperative research. OSU oceanographers doing research in Latin America were confronted with inexperienced, often inadequately trained counterparts in local institutions. At the same time, they were well aware of the potential disadvantages to Latin Americans of joint research, disadvantages often faced by Third World academics who work with scientists from developed nations. Invited to join a cruise organized by visiting scientists, local scientists nevertheless have no voice in the scientific work. And when the cruise is over, the local scientist has gained very little from the experience. Furthermore, the end of the cruise also frequently marks the end of communication between the scientists until another cruise is planned, once again, unilaterally. On their part, OSU scientists sought ways to correct this situation, insofar as possible making local scientists equal partners in research or at least enabling them to benefit more from cooperative ventures.



Port of Veracruz, Mexico.



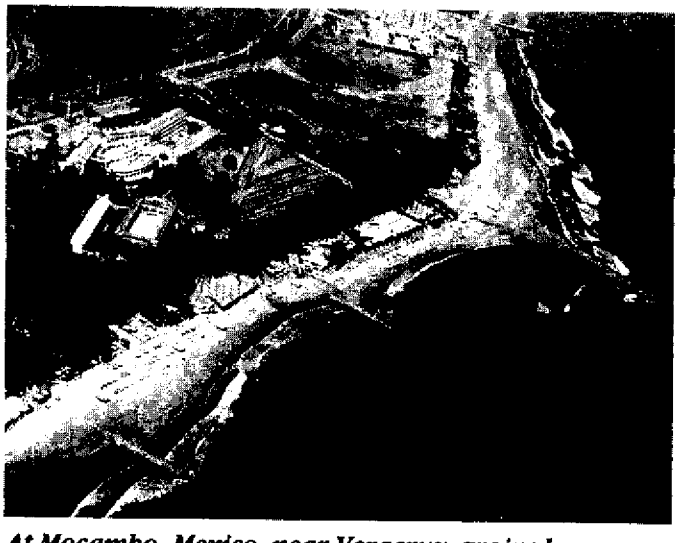
The Instituto Profesional de Osorno fish hatchery at Lago Rupanco is the site of cooperative research projects between OSU and the Instituto.

OSU'S LATIN AMERICAN OCEANOGRAPHY PROGRAM

In 1973, Oregon State University formalized its involvement with the Latin American marine community by establishing the Latin American Oceanography Program. Our goals (which have changed little over the years) were to help Latin American institutions improve their oceanography programs and to develop cooperative research projects between U.S. and Latin American oceanographers.

Although funding for the program, which came from diverse sources, was sporadic and often meager, the program itself involved a generous range of efforts, from research, to training, to the supply of textbooks.

Latin Americans came to us. A number of students from throughout the region enrolled in OSU's School of Oceanography. Technicians from Mexico spent several months working on geophysical data at OSU, while Argentinian technicians trained in current meter technology. A Peruvian geologist studied briefly with OSU marine geologists. This flow of students to OSU has continued unabated. Between 1973 and 1983, students from at least ten Latin American countries earned 38 master's degrees and 6 Ph.D.'s from the School of Oceanography; 5 master's degrees (four of them the Master of Agriculture in aquaculture) from the Department of Fisheries and Wildlife; and 4 master's degrees and 1 Ph.D. from the Department of Microbiology.

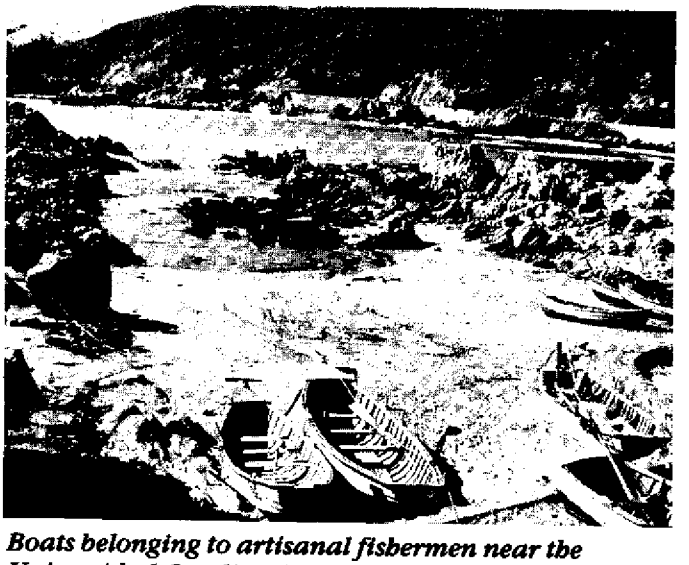


At Mocambo, Mexico, near Veracruz, groins have been built in an effort to stop sand erosion.

And we went to them. In various Latin American countries, OSU faculty offered workshops and short courses in marine phytoplankton, physical oceanography, and modern methods in geophysical research. In addition, the oceanography faculty participated in Chilean symposia on ocean policy and Anarctic development.

Some of our activities in Latin America were more tangible. We donated chemical reagents and equipment to the Universidad Autonoma de Baja California and books and journals to the Universidad Catolica de Valparaiso. And in 1978, the School of Oceanography provided partial support for the writing and publication of a basic Spanish text on oceanography, *Conceptos de Oceanografia Fisica,* by David Askren and Antoine Badan.

At the Universidad Catolica de Valparaiso, the cooperation that had been growing between U.S. and Latin American marine scientists came to fruition with the signing of a statement of understanding and mutual assistance (a *convenio*) between the Universidad Catolica de Valparaiso and OSU. This *convenio,* the first of many later such agreements, opened more doors to OSU researchers in Chile.



Boats belonging to artisanal fishermen near the Universidad Catolica de Valparaiso.

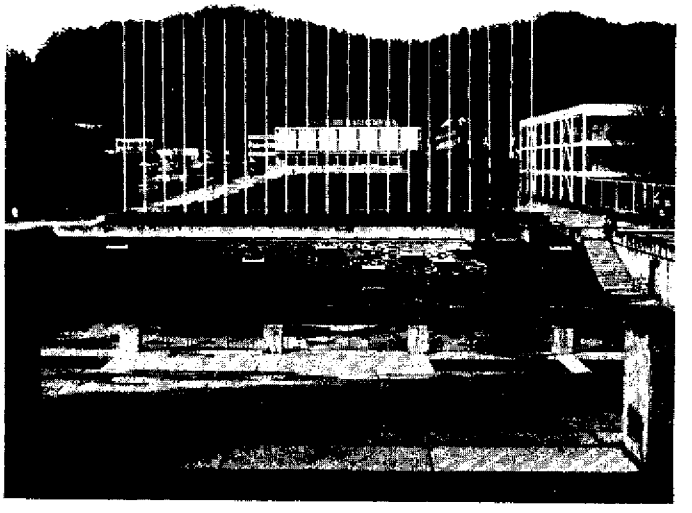
THE INTERNATIONAL SEA GRANT PROGRAM FOR LATIN AMERICA

What Sea Grant support meant to OSU's Latin American program was, above all, continuity and flexibility. We had learned that continuity is one of the keys to improving oceanographic capabilities in the developing nations. Thus, many of our activities in the last five years have been natural extensions of earlier efforts. Sea Grant funding also gave us the flexibility to provide assistance in fisheries, marine economics, and microbiology, areas invaluable to developing nations that need to make better use of their marine resources. A number of Sea Grant activities in Latin America have been sponsored in part by other organizations, such as the National Science Foundation, the Tinker Foundation, the OSU Foundation, and other branches of NOAA.

We based our International Sea Grant program on our already established Latin American program. However, our objectives have been defined with more care. They are

- to improve the exchange of ideas, data, and technology between Latin American and U.S. institutions
- to increase interest in and support for marine projects within the participating countries
- to help establish educational and research programs within the countries
- to provide information on the latest U.S. research projects and results
- to demonstrate the benefits of marine science research
- to broaden the horizons of U.S. professionals by giving them an opportunity to develop cooperative programs with foreign scientists

A subsidiary goal—one we feel we have attained—is to develop mutual trust, friendship, and respect between the U.S. and Latin American people, using the world ocean as an area of common interest. Such rapport, however, requires continual nourishment; once it languishes, it is difficult to revive.



The Universidad de Concepcion, Chile.

The Philosophy of OSU International Sea Grant

Our policy throughout our involvement in Latin America is to approach each project from the recipient nation's point of view. We try to understand each nation's cultural background and political nuances and to work within local limitations. Such a policy requires that the countries themselves identify their needs and the kind of help we can give them. Operating on a university-to-university basis rather than through governments has made our attempts to translate philosophy into action smoother.

While we are concerned with meeting Latin American needs as the Latin Americans perceive them, it is our intention that both sides benefit from any endeavor. And from the universities with which we deal, we expect substantial participation and financial contributions. To date, we have received both in abundance in the form of local laboratory and office space, staff time, travel funds, lodging, daily expenses, the use of ships, assistance in clearing customs, help with ship clearances, and logistical support.

Highlights of the Program

Our program emphasizes education, training, and advisory services. We concentrate our efforts in Chile and Mexico, although faculty from other countries—Peru, Argentina, Ecuador, and Costa Rica—have participated. In the past five years, OSU's activities have grown out of a wide variety of interests and activities.

Chuquicamata copper mine in northern Chile. Copper is a major export from the ports of Chile.

Aquaculture

Wilbur Breese's two courses in molluscan culture led to the acceptance of new oyster culture techniques from Chiloe to Antofagasta. In addition, Chilean scientists have indicated an increased interest in mussel culture along the coast and are attempting to rear the Pacific oyster and the native scallop in the Coquimbo and Antofagasta areas.

Two aquaculture short courses—on general aquaculture and on the culture of salmonids—were offered by Carl Bond (like Breese, from the Department of Fisheries and Wildlife). The main impact of the general aquaculture courses, attended primarily by instructors from secondary and postsecondary schools, was to broaden the outlook of the students through exposure to aquaculture methods used in other parts of the world. The salmonid seminar drew a more eclectic audience—teachers, fish culturists, businessmen, and biologists.

Infectious diseases of fish were the subject of three courses taught by John Fryer and some of his associates in the Department of Microbiology, a team that has done similar work in Japan, Taiwan, Korea, the USSR, and many other nations. The first course introduced students to bacterial and viral diseases of fish. The second course, which stressed bacterial pathogens of salmonids, offered a more detailed description of these pathogens and laboratory methods for their isolation and identification. The third course was a response to demands by Chileans working in fish pathology for more advanced training in cell culture. It was an intensive laboratory session which gave all the students a chance to perform the techniques presented earlier.

During each of their stays in Chile, Fryer and his colleagues have visited fish-farming facilities and consulted with individuals interested in aquaculture. Such consultations have included private fish farmers, university professors, and government officials. The subsecretary of fisheries in Chile, Roberto Verdugo, has requested the assistance of Fryer's group in creating a fish disease control policy for his country.

Oceanography

During two visits to Chile, physical oceanographers Paul Komar and David Enfield gave seminars and short courses on beach processes and ocean surface waves and on large-scale, air-sea interactions as they relate to climatic variability from year to year. Although attendance from outside of Chile was disappointing, the courses did bring about more lasting relationships between U.S. and Latin American scientists. In Enfield's case, the contacts led to a joint project in ocean wave studies at the Universidad Catolica de Valparaiso.

Mexican institutions hosted two oceanographers in separate 1981 trips. Bruce Mate's lectures on marine mammals in Ensenada (at the Centro de Investigacion Cientifica y Educacion Superior de Ensenada) and La Paz (the Universidad Autonoma de Baja California Sur) were attended by graduate and undergraduate students. In Veracruz and Manzanillo, Victor Neal conducted short courses and seminars on marine resources, coastal processes, and education.

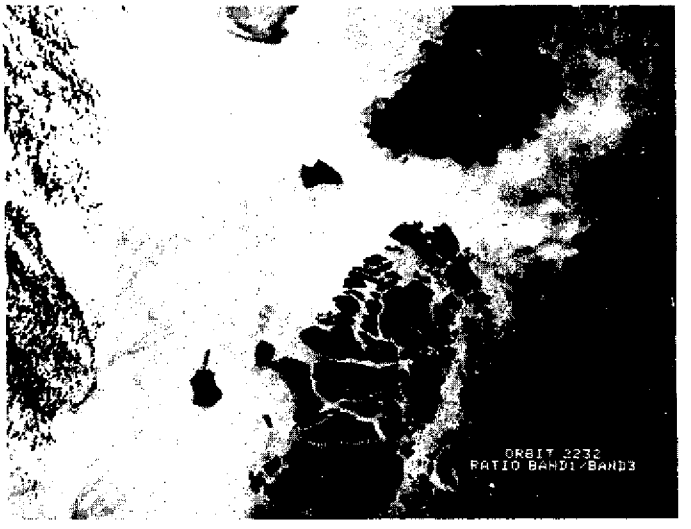
Bruce Frey found a combination of formal teaching and cooperative research to be highly effective for exchanging information. In his 1981 course at the Universidad Catolica de Valparaiso, "Research Methods in Phytoplankton Primary Production," Frey had his students grow large cultures of natural phytoplankton with various environmental perturba-

tions and follow the growth of the cultures during the course of the class. This gave class members a chance to practice most of the techniques they were studying and to observe the growth dynamics of phytoplankton. Later, with additional funding from the National Science Foundation, Frey and Boris Ramirez Reyes of the Universidad Catolica de Valparaiso conducted an extensive study of the biological and physical properties of a fjord in southern Chile.

In another cooperative project, Stephen Neshyba of OSU and Eduardo Uribe, director of the marine biology program at the Universidad del Norte, Coquimbo, Chile, have been studying the patterns of surface water movement and surface chlorophyll in relation to fishery data off the coast of Chile. Using the facilities of the National Environmental Satellite Service, the researchers have acquired extremely detailed satellite photographs of offshore chlorophyll distribution. The pictures should be very useful in Chile's fishery development program.

In 1979 at the Universidad de Concepcion, Chile, marine microbiologist Richard Morita began a study of *Thioploca,* a higher bacteria that makes up approximately 50 percent of the biomass in the ocean floor off the coasts of Chile and Peru. Morita's attempts to isolate the organism in pure culture, if successful, will open new avenues of research into *Thioploca:* its true role in the food chain, in the chemistry of the pore water of the sediments, and in the conversion of sediments into rock, and its contribution in the carbon, nitrogen sulfur, and phosphate cycles of the area.

Occasionally, the activities of OSU faculty participating in the International Sea Grant Program for Latin America lead to to projects which, although not funded by Sea Grant, advance the Sea Grant work. One such project is that of oceanographers Victor Neal and William Quinn, who are training Latin American scientists to collect, process, and interpret long-term oceanic and atmospheric data. Under a grant from the Tinker Foundation, the OSU oceanographers are teaching Latin Americans how to obtain better quality information from existing data-collecting stations on the west coast of South America (both on the mainland and on such islands as Easter Island, Juan Fernandez Islands, and the Galapagos). The accurate monitoring and prediction of interactions between the air and the sea are of considerable economic value to coastal fisheries and aquaculture endeavors of the region and to industries and agencies developing offshore resources, such as energy.



Cooperative research produced this satellite image of the distribution of sea surface chlorophyll off the coast of Chile. White indicates high chlorophyll content.

Fisheries Management and Economics

A two-part workshop, "The Role of Dynamic Models in Fishery Management," was conducted in Osorno and Valdivia in 1980 and 1981, respectively, by David Bernard and Howard Horton, Department of Fisheries and Wildlife, and Fred Smith, Department of Agricultural and Resource Economics. The workshops dealt with the biologic and economic concepts, methods, and models used in contemporary marine fisheries management and with advanced socio-economic and multispecies management techniques. To illustrate their points, the instructors used case histories of prominent Chilean fisheries.

The workshops were fruitful. First, they created a forum for the exchange of ideas and data among university and federal fishery biologists in Chile. Second, fisheries managers in Chile began to use dynamic models to formulate their management of certain species: the common hake, the colorado langostino, the Juan Fernandez langostino, and the Spanish sardine. Third, scientists involved in the workshops initiated a cooperative research project to investigate the possible anadromous behavior of rainbow trout introduced to Chile. Finally, four workshop attendees have entered advanced degree programs in the U.S.

In 1983, Fred Smith visited the Universidad Catolica de Valparaiso to consult with administrators

about the feasibility of establishing a master's program in fisheries management. Further, Smith helped prepare two new joint research proposals with Brazil's Ministry of Agriculture (SUDEPE) and the country's agricultural development agency (EMBRAPA). The first proposal, entitled "The Improvement and Stabilization of Export Revenues from Brazilian Lobster, Red Snapper, Shrimp, and Catfish," calls for economists to look at demand characteristics and market structure for these products. The second proposal involves the study of the production and marketing costs, distribution, and demand characteristics for tilapia.

A fisherman in the harbor of Callao, Peru.

Extension

Extension activities in Latin America during the past five years, as is true of such advisory activities anywhere, have been multifaceted, ranging from workshops and seminars, to the provision of equipment and library material, to training Latin American scientists in the United States. Indeed, much of the work already discussed in this brochure could be considered extension work.

The first marine extension workshop ever conducted in South America was held at the Universidad de Chile in Antofagasta in 1980. The workshop dealt with basics: the requirements and reasonable goals for any extension service and ways to organize, administer, and evaluate extension programs. The main U.S. participants at Antofagasta were Bruce Wilkins of Cornell, project leader of the New York Sea Grant Extension Program and associate director of the New York Sea Grant Institute; William Wick, director of OSU's Sea Grant College Program; and Victor Neal, assistant dean of OSU's School of Oceanography.

In a 1983 workshop at Osorno, Chile, on advanced audiovisual methods, Howard Horton, fisheries professor and leader of the Marine Advisory Program, and Jon Root, director of OSU's Communications Media Center, presented material on the use of video productions, slide/tape shows, and other self-paced methods of instruction in classrooms. Tom Gentle demonstrated photographic advances and techniques for use in extension work. During the workshop, the students produced a video tape on the first introduction of steelhead trout to Chile. The tape was shown on national TV. Stimulated by their work at the conference, the students formed a national society for audiovisual and media technicians which plans to meet annually to continue the interuniversity communications initiated in the workshop.

Physical oceanographers in Latin America found a useful tool in Stephen Neshyba and Tomas Fonseca's Spanish instruction manual, "Corrientes Costeras/ Manual de Mediciones y Analisis," printed in a 1979 issue of the journal *Investigaciones Marinas*. An instance of a fruitful cooperative project, the manual was written at the Universidad Catolica de Valparaiso, where Fonseca is a member of the faculty. Its importance lies in its use in collecting and analyzing physical oceanographic data.

OSU was able to meet quickly at least one pressing need of the marine community in Latin America. In the early years of Sea Grant's interest in Latin America, visits to Chilean institutions had revealed a serious shortage of library materials. In response, we sent over the years approximately four tons of surplus reprints, journals, and books to the Universidad de Chile at Osorno, the Universidad Catolica de Valparaiso, the Universidad de Concepcion, and the Universidad de Colima, Mexico. Shipping costs were shared by OSU and the recipient universities.

In related donations, the OSU School of Oceanography shipped a crate of books, journals, used and surplus equipment, and spare parts to the Universidad Catolica de Valparaiso and a surplus mechanical bathythermograph (an instrument for measuring sea temperature at various depths) to Costa Rica's

Geographic Instituto for use by all oceanographers in that country. A second bathythermograph was donated to the Instituto de Fomento Pesquero in Chile.

For several years, Roderick Mesecar, School of Oceanography, has published a marine-technology newsletter called *Exposure*. The newsletter, which describes technological improvements and developments in marine research in the U.S., emphasizes the do-it-yourself approach to marine instrumentation. Until recently, Mesecar distributed the publication to nearly 90 countries throughout Latin America and other parts of the Third World. The newsletter's practical approach to technology has made it well received.

While engaged in these extension activities, OSU faculty sought out and encouraged Latin American students and faculty whose abilities and interests made them excellent candidates for further training. Nelson Silva was one such scientist, and his association with OSU has been a rewarding example of continuity between training and application. In 1975, Silva, a staff member at the Universidad Catolica de Valparaiso, enrolled in the graduate oceanography program at OSU, from which he received an M.S. Several years later, Silva spent one month at OSU learning how to set up and operate at sea an automated chemical analysis unit (the Autoanalyzer II). Silva returned to Chile with the Autoanalyzer, which he continues to use at sea in his own research.

University professors from throughout Chile participated in a 1983 workshop on advanced audiovisual methods. The workshop was hosted by the Instituto Profesional de Osorno and conducted by OSU.

Conferences

Conferences have a value beyond that of the information exchanged by participants. They can draw from a larger population of interested people than can workshops or short courses. They usually cover a wider variety of subjects. And they allow scientists—particularly those from remote areas—to make contacts that otherwise are simply not available to them.

Conferences have had an important place in the International Sea Grant Program for Latin America. Three major meetings were those at the Universidad Catolica de Valparaiso, March 26-April 6, 1979; at the Universidad de Colima, June 14-18, 1982, in Manzanillo, Mexico; and at Viña del Mar, Chile, with the Universidad Catolica de Valparaiso, May 16-20, 1983.

The 1979 two-week Interamerican Conference on Marine Science and Technology in Valparaiso marked the beginning of Sea Grant's support of OSU's Latin American program. Those who attended the meeting were briefed on the results of research U.S. scientists had been doing in the region, on the present status of research, and on future needs. The presentations emphasized marine resources and the problems associated with extended economic zones. For example, OSU fisheries specialist Richard Tubb spoke on the necessity for Chileans to collect scientific information in order to manage their fisheries in Chile's new 200-mile zone.

At the Interamerican Workshop on Marine Resources in Manzillo, U.S. specialists made recommendations to Latin American institutions concerning the establishment or improvement of marine extension programs and helped develop undergraduate curricula in marine resource management and ocean engineering. In the section of the conference dealing with extension, U.S. academic and government personnel described extension programs in the U.S.: their philosophy, organization, and administration and the ways in which they are evaluated. Other speakers, many of them from the region, outlined the specific needs of marine extension work in Mexico and the rest of Latin America. Perhaps the most impressive results of the conference were the two curricula drawn up by international panels. The curriculum created for ocean engineering meets the requirements of the Accreditation Board for Engineering and Technology, which certifies all accredited baccalaureate engineering programs in the U.S.

The 1983 International Conference on Marine Resources of the Pacific, held in Viña del Mar, commemorated a decade of cooperation between

Oregon State University and the Universidad Catolica de Valparaiso and marked the fifth year of U.S. International Sea Grant work in Chile. Ably organized by the Universidad Catolica de Valparaiso, the conference was divided into three sections: coastal resources, aquaculture and fisheries, and the Law of the Sea. We were particularly pleased that over two-thirds of the speakers were from Latin America and that attendance was high (over 250 went to the first session).

The Universidad Catolica de Valparaiso, Chile.

Convenios

In 1975, OSU signed a statement of understanding and mutual assistance with the Universidad Catolica de Valparaiso. Its success led to many similar agreements. Since 1979, OSU has signed *convenios* with eight Latin American universities: Universidad de Chile, 1979; Universidad de Concepcion, 1981; Universidad Austral de Chile, 1982; Universidad del Norte, 1982; Instituto Profesional de Osorno, Chile, 1982; Escuela Politecnica del Litoral, Guayaquil, Ecuador, 1982; Direccion de Hidrografia y Navegacion de la Marina, Callao, Peru, 1982; and Universidad de Colima, Mexico, 1983.

SUMMARY

Complete freedom of research at sea no longer exists. The Law of the Sea Treaty has encouraged many countries to adopt absolute-consent requirements; such requirements are expected to be soon nearly universal. Therefore, we must maintain a continuing cooperative program if we expect to do research in the territorial waters of other nations, specifically those of Latin America. Recognizing this need and the potential value, to both sides, of cooperation in marine matters, OSU has long been involved in a program of mutual assistance in Latin America.

The advent of International Sea Grant funding in 1978 gave continuity, additional breadth, and sharper focus to the OSU Latin American Program. It enabled us to continue important aspects of the preexisting program: technology sharing, library assistance, advisory service, and cooperative research. It permitted the inclusion of marine microbiology, fisheries, and economics. And it gave us the freedom to more closely tailor our activities to the needs of marine scientists in Latin America.

Although we cannot always quantify our success in training others, we have certainly made strides in this endeavor, as well as in our attempts at meaningful joint research. Perhaps our greatest success has been in our attempts to create a much-needed atmosphere of trust and cooperation between marine scientists in Latin America and the United States. As one OSU oceanographer has observed, the best things to have emerged from our efforts to train our Latin American counterparts—indeed, to have emerged from the entire program—are the general exposure of people from one way of life to people from another and the contacts made between scientists vitally interested in the same thing—the world ocean.