CoHemis... update

Overcoming through cooperation

March 15, 1993
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University of Puerto Rico at Mayagüez -- National Science Foundation

CoHEMIS PARTICIPATES IN ITS CREATION:

A WORLDWIDE TECHNOLOGY ASSESSMENT ORGANIZATION IS BORN

The UN's Science and Technology Branch, headed by Dr. Carlos Nones-Sucre, laid the groundwork for the creation of an *International Association of Technology Assessment Institutions* in a meeting held on January 29, 1993. The "Special Session on Technology Assessment Network Building" of the "Expert Group Meeting on Technology Assessment, Monitoring and Forecasting", which took place at the UNESCO headquarters in Paris, France with the participation of CoHemis, discussed a draft constitution for this association and designated an organizing committee with the mission of holding its first assembly this Summer in Norway.

TA for Development was defined as the aggregation of the functions and analytical processes, planning and management which may be necessary for establishing technology policy and for the identification and evaluation of technology alternatives capable of contributing to national and international development. It includes search, monitoring and forecasts related to technology, in addition to the evaluation of its economic, social, cultural, environmental, and ethical impacts. The expert group meeting set the stage for the network-building effort by demonstrating the importance of the subject. In the words of Dr. Nones-Sucre: "The capabilities to monitor, foresee and assess technological developments and their consequences are a crucial element of the scientific and technological base of a society".

The congressional Office of Technology Assessment (OTA) and Argonne National Laboratory represent the US in the organizing committee. CoHemis offered to collaborate with its Latin American member, Jacques Markovitch (University of Sao Paulo), in contacting entities in Mexico and the Caribbean Basin.

CoHemis was invited to participate in the Expert Group Meeting by Dr. Nones-Sucre, who is a member of its advisory committee. The S&T Branch has been entrusted to become a focal point for Technology Assessment for Development by the UN General Assembly. It organized this activity jointly with UNESCO and UNIDO, the UN's organization for indus-

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TA Activities at UPRM

In order to get UPRM's faculty more involved in TA and to demonstrate both the importance of TA and Puerto Rico's comparative advantage in this field, CoHemis is working on the following activities:

CoHemis and the UPRM Department of Economics have organized a one-day conference on TA to be held on April 27 at Mayagüez. It will emphasize: the concept of TA; the relationship between technology, TA, and economic development; and the importance of the social, ethical and cultural variables in the TA process. Together with the UPRM Center for International Perspective, CoHemis will sponsor a one-day conference on the Export of Technical Services on May 5th. This second conference will focus on markets, niches, regulations, technology transfer and assessments, and strategies for exporting services. The conferences aim to foster the creation of a UPRM network of experienced and potential practitioners willing to undertake TA in P.R. and elsewhere.

CoHemis and FomExport, the branch of the government of PR in charge of promoting exports, are designing a similar activity to be held in San Juan this Summer to address the professional sector and the technology community beyond UPRM. Special emphasis will be placed on joint venture projects in the international arena.

Appointments from Bolivia, Brazil and Colombia for CoHemis

Brazil and Colombia, which had not been present at the Hemispherical Cooperation Conference which founded CoHemis in Mayaguez in 1991, have named their respective delegates to the center. On the other hand, Bolivia's Science and Technology Adviser to the Vice President complimented CoHemis for its publication of the Conference Proceedings and designated the President of the Bolivian Academy of Sciences as the country's liason with CoHemis.

Brazil's CNPq named Dr. Ivan Rocha, while Colombia's Colciencias designated Dr. Jaime Tabares-Mesa. We are grateful for the confidence on our center which is implied in these appointments, and congratulate them for upholding the idea of international cooperation for the benefit of all the countries of the Americas.

CoHemis Projects for 1993

At present, CoHemis is working on the planning or implementation of the following projects:

Promoting joint research: As reported in *Update* 2.5, CoHemis submitted a three-year proposal to NSF for conducting three two-day technical conferences with complementary workshops on the third day. These would take place in 1993, 1994, and 1995 at Mayagüez, Puerto Rico. They shall provide a forum for potential joint research collaborators to meet and exchange ideas on possible projects and supply them with information on how the Center and its consortium of US institutions may cooperate. The main objective is to propitiate the formation of multinational joint research teams to conduct research under the CoHemis umbrella. The conference will provide time and facilities to propitiate the formation of multinational teams of researchers. The teams formed will be asked to submit preproposals at the end of the

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CoHemis 1993 projects...

conference.

Researchers from LAC and Canada who are interested in participating in joint projects of regional interest at UPRM or CoHemis Consortium institutions will be asked to submit work statements to their national S&T organizations. The work statements will outline one or two possible projects and shall include letters of intent declaring the researcher's desire and availability to relocate to continental US or PR with a temporary visa during the research period and return to his/her country upon its termination. This letter must be endorsed by the person's university or institution. US and Canadian industry with Latin American operations and the Programa Bolivar of joint industry research in LAC will be invited to participate. The UN, UNESCO, OAS and BID will be invited, as well as the University of Miami's North-South Center, UNM's ISTEC, COLCYT-SELA, and other hemispheric initiatives.

Collaboration with Argentina: As reported in the previous *Update*, the Center is coordinating the participation of Sandia and Lawrence Livermore National Laboratories, and three researchers and graduate students from the Mayagüez Campus, in an international joint project of the University of Cordoba, Argentina. Its purpose is to determine the seismodynamics of two nuclear power plants.

CoHemis Consortium: CoHemis is working to complete the creation of the CoHemis Consortium. The National Laboratories of Sandia and Los Alamos, plus Colorado State and Virginia Tech Universities, have responded favorably and are considering or waiting for drafts of a possible agreement with UPRM concerning CoHemis. Argonne Lational Laboratory and the Universities of New Mexico and Georgia Tech are being contacted, as will be done several NSF Engineering Research Centers.

Joint Research Pilot Program: The consideration of the proposals submitted to the Puerto Rico Science and Technology Board, including four CoHemis proposals, has been delayed because of recent changes in membership. The center continues to follow up on them.

Diversification of Funding Sources: The Center has submitted a proposal to the Tinker Foundation as an initial step in the implementation of a complementary funding plan based on proposals to foundations and other sources.

Hemispheric Conference on TA: The proposal to the Tinker Foundation mentioned above seeks to host a Hemispheric Conference on Technology Assessment. This would help the U.N. initiative for creating a world network for TA and provide an opportunity for UPRM and Consortium specialists to serve the region.

Strategic Plan for Caribbean Aquaculture: Professors from UPRM and the University of Rhode Island are developing a proposal to coordinate a strategic plan to enhance aquaculture in the Caribbean. This initiative will receive support from CoHemis in the collection of information on aquaculture plans in other countries of the region and in the coordination of regional research in mariculture.

Possible UPRM agreement with Sandia and NASA

As a result of contacts made by CoHemis and members of the PRELECT network, an important meeting was held at UPRM on March 4, 1993 with visitors from Sandia National Laboratories and the National Aeronautics and Space Administration (NASA). Sandia's Vice President for Energy and Environment, Dr. Dan L. Harley, and Dr. Nestor Ortiz, SNL's Director of Energy and Environment, came to UPRM with Dr. Michael Lee, from NASA and the University of New Mexico (UNM).

The distinguished visitors discussed possible future collaborations with Drs. Alejandro Ruiz Acevedo, Chancellor of the Mayaguez Campus, José F. Lluch, Dean of Engineering, and his associate deans, David Serrano and Jorge Ortiz-Alvarez, Dr. José R. López, Acting Director of the R&D Center, CoHemis Co-director Jorge I. Vélez-Arocho, and Leandro Rodríguez, Professor of Civil Engineering and former dean. They also visited some Department of Electrical and Computer Engineering research laboratories and spoke with graduate students.

Dr. Harley spoke of a possible memorandum of understanding for supporting collaboration between DOE, UPRM, and other minority institutions. It may include bringing researchers from the National Laboratories to the UPRM graduate school as visiting professors, research opportunities for UPRM professors and graduate students in Laboratory projects, and increasing the number of Hispanic minority graduate students at UPRM. Dr. Lee emphasized the mutual benefits of UNM joining UPRM in the CoHemis Consortium and spoke of NASA's commitment to enhancing graduate education for minorities. All parties came out very satisfied with the meeting and agreed on meeting again soon with a specific agenda.

INTERACTION BETWEEN CoHEMIS AND OTHER U.P.R. PROGRAMS

As part of an effort to increase collaborations with other programs of the University of Puerto Rico which seek to improve research and graduate education, CoHemis made a presentation in the joint annual conference of the NSF-PR Experimental Program to Stimulate Competitive Research (EPSCoR) and the PR Chapter of the American Association for the Advancement of Science.

The conference was held in the UPR's Mayaguez Campus on February 6, 1993 with the attendance of more than 100 scientists, mathematicians and engineers. Closer contacts will stimulate EPSCoR researchers to use the CoHemis' network to submit proposals jointly with researchers from Latin America and the Caribbean on projects

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Editor: Luis F. Pumarada

Center Co-directors: Luis F. Pumarada and Jorge Ivan Velez-Arocho.

Coordinator: Luz Leyda Vega

Mailing address: CoHEMIS, University of Puerto Rico, Mayagüez,PUERTO RICO 00681-5000.

Telephone: (809) 265-6380

Fax: (809) 265-6340

Worldwide TA Association...

trial development.

Twenty seven experts from Argentina, Brazil, China, Spain, United States, Philippipines, France, Germany, Ghana, Netherlands, Hungary, India, Israel, Japan, Kenya, Korea, Mali, Nigeria, Norway, Poland, Russia, Switzerland, Togo, Sri Lanka and Venezuela presented papers. Eleven representatives from UN organizations and 18 delegates from other institutions participated in the discussion. The UN agencies present were: UNDP, UNEP, UNU/INTECH, ECA, ESCAP, WHO, ILO, FAO, UNESCO and UNIDO. CoHemis submitted a paper (summarized below) which outlines the possible role of the center pertaining TA in the Americas.

Adnan Badran, UNESCO's General Assistant Director for Science, formally opened the activity. Dr. Nones-Sucre narrated the events which led up to the meeting. He emphasized that its main purpose was to enhance the endogenous science and technology capabilities of developing and transition countries, and stated three objectives: develop a deeper understanding of the processes of TA and management of technological change, revising existing methodologies, and considering alternatives and recommending priorities for future international cooperation.

The meeting's final recommendations included, among others, the following:

- Develop an inventory of existing technologies relevant to developing countries.
- Institutionalize TA processes in developing countries and promote endogenous TA expertise.
- Make known the great need for TA among those who make policy decisions pertaining technology.
- Provide education on TA processes and techniques in the principal educational institutions of developing countries and experiential learning through participation in projects at more developed countries.

In Puerto Rico, TA is not as yet institutionalized within any branch of government. UPRM's R&D Center, with its history of TA studies and EISs, should become PR's main TA tool for both the public and private sectors. Latin American and Caribbean countries may stand to gain from this through CoHemis actions for promoting the participation of their graduate students and experts in these TA projects. Training and education programs on TA established at UPRM may be enhanced by US agencies such as EPA and AID to serve hemispheric needs.

Summary of the CoHemis Presentation:

Technology Assessment Issues and a Role for CoHemis

CoHemis acknowledges that in the context of developing countries technology assessment (TA) is at least as important as R&D and probably more cost-effective. Many developing countries are not exploiting existing technologies which may be important for their development, while too often wrong choices are made in the type of technology to transfer to a country or in the way in which it is implemented. Our center can foster TA in Latin America and the Caribbean (LAC), lower the cost of TA in the region, enhance its effectiveness and responsiveness, and help to link the region to a proposed world TA network.

Puerto Rico's technology community, specially UPRM's faculty, has experience and expertise in US-type environmental impact studies, pollution control, and technology assessments. Moreover, PR shares many social, economic, and climatological characteristics with the countries of LAC, and identifies itself with their problems.

UPRM has accredited programs in the main fields of technology, in those disciplines which support it and evaluate its impacts, and in those which apply it to economic growth: engineering, agricultural sciences, natural sciences, marine sciences, social sciences, economics, and business administration. For two decades, the UPRM-DOE Center for Energy and Environment Research did technical, economic, planning and environmental impact studies on energy technologies such as: solar ponds, ocean thermogradient energy conversion (OTEC), solar cooling, biomass-energy cane, and wind turbines.

CoHemis can use its comparative advantage in the Western Hemisphere to: promote the perception that TA pays offs; encourage the inclusion of TA in LAC university curricula; facilitate the participation of LAC scientists and engineers in joint projects for experiential learning, and foster the creation of competitive multinational TA teams, helping them to secure projects and financial resources. The center would like to foster the creation of a Caribbean Technology Assessment which could: put the expertise of US Hispanics and Puerto Ricans at the service of LAC and provide infrastructure support (e.g.: measurements, data analysis and interpretation) to LAC assessors; maintain a data bank on LAC assessors, reports and other pertinent TA information on call for policy makers need information or a particular expertise; and develop models for cooperative technology monitoring, forecasting, and assessment processes involving the public and private sectors, parallel to the British Center for the Exploitation of Science and Technology.

As suggestions to the UN Science and Technology Branch on its role in fostering worldwide TA for Development, CoHemis recommended that the S&T Branch become a clearinghouse for exchanging information, reports and results worldwide, disseminate models for market mechanisms providing reward structures which strengthen sustainable systems, and promote the concept that the earth is but a single system, environmentally as well as economically and in terms of its finite resources. The S&T Branch, which had specifically asked for such suggestions, could also conduct or sponsor global-level T.A. and systems studies for technologies with potential global impacts.

NEW COORDINATOR IN CoHEMIS

Ms. Luz Leyda Vega became CoHemis' new coordinator, replacing Eng. Gisela Gonzalez. Gisela had to move into the Center for Infrastructure Research upon the resignation of its Director, Dr. Carlos I. Pesquera to head Puerto Rico's Department of Transportation and Public Works.

Luz has been working at CoHemis since 1991, when she was a honor-roll Senior at UPRM's School of Business Adiministration. A bright, enthusiastic, hard worker who shares our goal of overcoming underdevelopment and global competition through hemispheric cooperation, she heads an excellent support staff made up by Ms. Ana Alvarez, secretary, and UPRM students Glorymar Peña, Carlos Poventud and Omar Laboy.

CoHemis has just adquired a Macintosh Centris 650 computer with the necessary peripherals to enhance its desktop publishing capabilities. We now have three desktop and one laptop computer, a fax and a photocopy machine in our office at the UPRM R&D Center. We are installing a line to the Campus' VAX computer to access the Internet and Bitnet networks.

THE *LAND GRANT* MODEL: TECHNOLOGY TRANSFER FOR THE AMERICAS

The application of the *land grant* model and its extension service to high technology and manufacturing appears to be one of the most favored alternatives for improving the competitiveness of the United States in the post-cold war era. In developing nations, this model could be made more effective by encompassing technology assessment in addition to the transfer to local agriculture and industry of both imported technology and innovations developed within the country. The Mayaguez Campus, the land grant, sea grant and space grant branch of the University of Puerto Rico, is in a very good position to implement this extended model in Puerto Rico and to collaborate, through CoHemis, toward its application in other countries of our hemisphere for the benefit of all.

Manufacturing extension is based on the notion that government should do more to speed the flow of technology to manufacturers. Its advocates in the US say that government should set up networks of local centers, modeled on state agriculture extension services, to provide information about advanced technologies and business practices to the small- and medium-sized firms.

The National Competitiveness Act of 1993, introduced in both branches of Congress, would authorize $150 million in FY 1994 and $280 million in FY 1995 for a new "National Manufacturing Outreach Program" housed in the National Institute for Standard Technology (NIST). The Manufacturing Outreach Program would link state manufacturing extension centers and NIST's Manufacturing Technology Centers with new efforts by NIST to help states set up manufacturing extension centers. President Clinton has expressed his support for manufacturing extension and has proposed creating 170 Manufacturing Extension Centers, at a cost of $510 million per year by 1996. Extension service, applied to agriculture, is a feature of the land grant university.

The land grant institutions in US territory were created and shaped by laws enacted between 1887 and 1914 with regard to agriculture and partly extended to engineering. The world leadership still enjoyed by US agriculture is in good part a result of the ability of the land grant model to develop, teach, and transfer agricultural technology from the university to the end-user. This national, federally-supported program is flexible enough to respond to the needs of small- and mid-sized operations and sensitive to regional differences. Its experimental stations and extension service pulls the researchers out of the ivory towers and puts them in contact with the end-users and their real problems. The agricultural experimental stations are university facilities for research, development and demonstration of new technology. The extension service is an outreach program which provides services and on-site practical training in new technology directly to producers and their workers.

In the case of engineering, the land grant laws only support teaching and did not create experimental stations and extension services. The comparatively poor record of the United States in putting new technology into competitive products may be amended by extending the full model into engineering, high technology and manufacturing. Inspired by the success of technology transfer programs enacted at the state level, such as industrial extension services and research/technology parks, several US congressmen have introduced bills with this purpose since 1992. The main thrusts of the national efforts would be to improve the practical education of engineering students and a more prompt and effective transfer of university-created technology into production, especially for small- to medium-sized industries.

In less developed countries, the impact of a similar program should be much bigger and decisive. The land grant model can be applied not only to new technology created by the universities for the country's needs but also to technology already developed in more developed countries which may be useful but has not been yet successfully adopted locally. The grantee institutions can do the technology assessment studies, contribute to the technology management decisions, and help producers and workers to implement the technology.

The Mayaguez Campus has been applying the land grant model for eight decades in its School of Agricultural Sciences, and has similar programs in marine sciences and small business development. It is looking into extending the model to other technologies in Puerto Rico. The Campus may collaborate with other countries in the Americas in developing similar programs in their agricultural and industrial sectors.

SUSTAINABLE AGRICULTURE

In most countries, increases in food production must come from raising output per unit area, since most agricultural land is already being exploited and significant portions of it is being lost to urban development, transportation and other uses. The situation is made worse by the fact that yields are declining together with the increased application of fertilizer. Currently, developing countries are struggling just to maintain their actual agricultural research capacity, which is being asked not only to produce innovations to expand production but also to halt the decline of agricultural productivity.

Meanwhile, Rio's UN Conference on Environment and Development has raised world concern on the environmental impacts of many growth alternatives in agricultural production. Intensified agriculture may bring about loss of soil due to erosion, water-logging and salinization, surface and ground water contamination from plant nutrients and pesticides, resistance of insects, weeds and pathogens to present methods of control, and the loss of natural habitats. Expansion of agriculture into forests and fragile lands contributes to desertification, soil erosion, species loss, degradation of water quality, and climate changes.

According to Vernon W. Ruttan in his recent article in the Interamerican Development Bank's newsletter, the basis for the information included here, the real challenge is to develop a basic research agenda that will produce the technical and institutional knowledge that society needs in order to develop a sustainable agriculture. This author claims the main issue to be the conflict of present versus future generations, since the increasing the use of non-reproducible resources above present levels invites a future catastrophe. They argue that in order to have the present generation pay the real cost of using the world's finite resources, the conventional methods used in assessments for discounting the future, which encourage the rapid depletion of resources, must change in order to make the users internalize the costs of actions,

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WORLD OFFICE OF YOUNG SCIENTISTS IN PUERTO RICO

The FISS World Office of Young Scientists, created by the successful First World Congress of Young Scientists, has become a reality. This office will help to develop leadership in young scientists so that they can bring their minds together to enhance the development of our society in an ethical manner. Dr. Jorge A. Velez Arocho represented CoHemis in this Congress, held at the Interamerican University of Puerto Rico in August, 1992.

The FISS World Office for Young Scientists is a program of the FISS Foundation, the International Federation of Scientific Societies, with headquarters in Venezuela. FISS is incorporated in twelve nations from the Americas (Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Salvador, Mexico, Peru, Puerto Rico, United States, and Venezuela) and three European countries (France, Italy, and Spain), and is supported by several other important countries in the five continents. The fundamental purpose of the FISS World Office for Young Scientists, which is supported by Interamerican University, is to initiate a creative dialogue with the following objectives:

Identify, describe or diagnose needs, anxieties, motivations, problems, and hopes of the young scientists of the world.

Help the development of regional or global strategies for the exchange, cooperation, and development of young scientists and their societies, and for the solution of common or inter-related problems.

Propose or explore synthesis methods that facilitate the convergence of different sciences in new disciplines or in particular applications.

Stimulate greater motivation for science and technology research in young scientists, oriented toward the well-being of humanity, peace, and the enhancement of education.

Promote scientific research whose results contribute practical solutions for the problems of humanity.

Stimulate friendship within the international community of scientists.

CoHemis will continue to collaborate wholeheartedly with this and all other hemispheric and global international cooperation initiatives for enhancing the positive applications of science and technology . The FISS World Office of Young Scientists is at:

Interamerican University
P. O. Box 1293
San Juan, P. R., 00919-1293
Fax: (809) 753-0152.

FORUM EMPHASIZES TECHNOLOGICAL INNOVATION

The Forum "Science and Technology in Latin America" of the First World Congress of Young Scientists, described above, emphasized the importance of technological development for Latin American countries and the necessity of their incorporation to the productive sector. This forum included the participation of representatives of Costa Rica and Venezuela, with Dr. Jorge Iván Vélez-Arocho, Co-Director of CoHemis, as its moderator.

Atty. Mario Cordero Maduro, from the Ministry of Sciences and Technology of Costa Rica, gave the presentation titled "Central-American Project of Investment in the Technological Development of Productive Sectors". He summarized the change that has occured in Latin America with respect to putting scientific knowledge to the service of productive sectors to support their competitive ability. The Central-American Project aims to design a scientific-technological basis to sustain the growth of that region by: improving research centers to enhance their service to productive sectors, training people in graduate studies and technical subjects, and improving the institutional frame that enhances regional cooperation in technology.

Dr. José Miguel Camino, of the National Council on Science and Technology Research (CONICIT) of Venezuela, presented "The Regional Integration of Science and Technology in Latin America". "No country can insert itself in the global economy if it doesn't improve its scientific-technological capacity", he noted, and added: "Science and technology must be coupled with the productive sectors if we want substantial economic development in our countries."

CONFERENCE ON NATURAL RISKS

The Puerto Rico Department of Natural Resources and its Planning Program for the Mitigation of Natural Risks will celebrate its "Conference on Natural Risk 1993" at the Emilio S. Belaval Theater of the Sagrado Corazón University in San Juan on June 2, 1993.

Papers will be accepted concerning: Vulnerability/Risk; Strategies/Projects of Mitigation; Concientization Programs; Improvements to the Building Code, Standards/Practices; Redevelopment Strategies; Communication Systems for Emergencies; Housing Relocation; Shelters; Evacuation Plans; Risk Control Works (for floods, landslides, etc.); Alarm Systems for Flash Floods; Operational Planning for Emergencies; Land Use Planning; Fulfillment of Laws and Regulations; and Mental Health/Epidemiology.

Abstract of papers may be submitted during March, 1993 in an 8.5" x 11" page, double space. Acceptance of papers will be notified on or before April 15, 1993. Please send all communications related with this Conference to:

Ms. Lourdes S. Bernier
Tel. (809) 722-1776
Acting Director, Natural Risks Planning
P. O. Box 5887
San Juan, PR 00906

New Chemistry Building Under Way at UPRM

The Mayagüez Campus took an important step towards maintaining its leadership in scientific education and high technology in Puerto Rico. On December 22, 1992 the contract for the construction of a new Chemistry building was signed for approximately $20 million. The facilities provided in this building, which will rely on the most modern computerized instrumentation, will be up to the challenge of the XXI Century. Research work will occupy approximately 40% of its capacity, with 36 research laboratories for professors and graduate and under-graduate students. It will be a milestone in the implementation of a future interdisciplinary doctoral program.

THE PROFESSIONAL OF THE NEXT DECADE

The ability to adapt to the changes of a dynamic environment, the appreciation of the individual needs of the employees, and the recognition of the international outlook of organizations will be the most important elements of the professional needed for the next decade, according to Dr. Jorge I. Vélez Arocho in a lecture presented to the National Quality Forum. This forum, held the last October 2, in San Juan, was sponsored by the PR chapter of the American Society for Quality Control (ASQC).

Dr. Vélez, co-director of CoHemis, emphasized the importance of communication between the university, the sectors that employ its graduates, and the professional organizations in the training of the work force to enable the professionals to conquer the challenges of the future.

Sustainable agriculture...

including technical change, which harm the environment.

He calls for striking a common ground between traditional economists and environmentalists and transform the concerns about sustainable agriculture into a research agenda and then into practice. Left alone, this situation can result in widespread hunger, rising food prices, threats to peace, and future environmental disasters. Solving it will require research strategies which pool together resources from many developing countries with common problems into solving regional issues with the participation of concerned developed countries. These strategies can benefit greatly from the coordinating and resource-pooling activities of regional, North-South organizations such as CoHemis.

The same issue of the IDB newsletter lists ten goals which according to bank president Enrique V. Iglesias should underpin the region's economic and social policies for the 1990s. This list includes, among others, to: increase the region's international competitiveness through the incorporation of advanced technology into the productive processes; carry out massive human resource development; intensify regional economic integration to improve international competitiveness, develop new ways for the region to participate in the international market, and ensure that development is environmentally sustainable. All of these goals are consistent with the mission of CoHemis.

Other UPR Programs...

able to produce short term benefits on a regional scale, the type of activity which CoHemis seeks to promote.

The main objective of the NSF's EPSCoR program is to improve the quality and quantity of competitive research in those regions of the United States having a lower level of competitive research funding. It supports the implementation of strategic plans to develop research infrastructure, as well as specific initiatives to strengthen competitive research. EPSCoR-Puerto Rico, headed by Dr. Manuel Gómez, a physicist from the UPR Río Piedras Campus, has been the fastest growing state-level program. The number of Puerto Ricans earning PhDs in science, math and engineering has doubled in the last five years, partly as a result of this program. Dr. Gómez is an individual adviser to CoHemis, and the Resource Center for Science and Engineering, which he also directs, has contributed to some CoHemis activities.

EPSCoR-PR supports, among others, research centers for materials, computational mathematics, metal clusters, terrestrial ecology, tropical marine biotechnology, and engineering infrastructure. The last two, plus a Laser and Spectroscopy Facility, are located at the Mayaguez Campus. These initiatives seek to make use of the inherent advantage of Puerto Rico's geographical and climatological setting and to build on existing strengths of its scientific community.

HEMISPHERIC OUTREACH BY UPRM FACULTY

Dr. Emir Macari visited **Mexico** from October 15 to 26, 1992 to offer several technical presentations related to his **Presidential Faculty Fellow** grant. He was invited by the National Council for Science and Technology (CONACYT).

Dr. Jay Banerjee visited the University of Los Andes at Mérida, **Venezuela** on invitation as a member of the panel to examine work on "The Optimal Design Method for Machine Elements".

Dr. Leandro Rodriguez participated from December 1 to 7, 1992, in the "Latin American Partnership Workshop" held at San Jose, **Costa Rica**. Dr. Rodríguez was invited by the Central United States Earthquake Consortium (CUSEC) to participate as a member of the United States delegation.

Dr. Manuel F. Rodríguez-Perazza has been appointed Vice Chair of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) Student Activities Committee. In this position, he will be responsible for the establishment and achievement of goals and standards for over fifty thousand engineering students in 145 countries throughout the world. He has also been appointed to the student activities task force of the **Transnational Committee of the IEEE**, where he will be interacting with distinguished professional engineers from all over the world.

Dr. H. Mario Ierkic was appointed to the **National Science Foundation** panel which recently reviewed Instrumentation and Laboratory Improvement (ILI) proposals at Washington, D.C. Dr. Ricardo López was involved in a similar activity for the Large Structures and Buiding Systems Program.

ARECIBO OBSERVATORY RESEARCH PROCEDURES

Dr. Mario Ierkic, UPRM Department of Electrical and Computer Engineering

The Arecibo Observatory (AO) is a research facility operated by Cornell University under a cooperative agreement with the National Science Foundation. Its radio-telescope and related facilities are available to all scientists from all over the world for observational research in Atmospheric Science, Radio Astronomy, and Radar Astronomy. Scientists interested in using the Arecibo facility for studies of the lower and upper atmosphere are encouraged to contact the author through CoHemis.

Scientists can use the AO facilities after their research proposals have been reviewed and accepted. Acceptance of proposals rests largely on scientific merits and on equipment availability. The review process takes from one to six months. The AO may provide some support for travel and for publication of results.

Some research programs at the AO are famous worldwide. Important radar and optical projects probe the earth's lower and upper atmosphere. The AO uses a steerable, 1MW peak power 430 MHz radar. This system is routinely used for atmospheric studies starting at tropospheric levels and reaching into the ionosphere.

Active areas of research include Radio Reflectivity Measurements of the Neutral Gas, Climatological Studies of Wind Profiles and Turbulence, and Orographic Effects on the Dynamics of the Atmosphere. Other areas include studies of Ionospheric Structure, Electric Fields, Temperature, and Composition. Artificially excited Non-Linear Plasma Phenomena are studied with the help of a powerful HF facility nearby. Other diagnostic facilities include a S-Band radar, a 46.8 MHz a radar, an Ionosonde, and the Optical Laboratory, with a Lidar for middle and lower atmosphere studies.