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A Directory of Institutional Resources

Supported by
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U.S. Centers of Competence for International Development

January, 1975

PREFACE

American universities have played major roles in the U.S. foreign assistance program almost from its inception. This experience has included providing training for foreign nationals, engaging in research studies to accelerate development programs, assisting in building counterpart institutions abroad, and participating in a multiplicity of technical assistance projects. In addition, some of the universities have maintained interests in developing countries quite apart from their involvement with the Agency for International Development or its predecessors in overseas technical assistance programs. The combination of these activities have resulted in an added international dimension to the traditional functions of the American campus concerns.

A significant degree of competence for developmental work overseas has been generated through continued involvement. Certain universities have tended to specialize in well-defined substantive areas, and have established contacts and communications with institutions in other countries which share similar or parallel interests, while others have specific-country ties.

Our Foreign Assistance program has taken steps to build permanence into such relationships and to provide additional opportunities for expanding institutional competence to respond to the changing needs of developing countries and donor agencies. The Agency received Congressional authority to use up to \$10 million each year for assisting "research and educational institutions in the United States for the purpose of strengthening their capacity to develop and carry out programs concerned with the economic and social development of less developed countries". This provision is expressed in Section 211(d), Title II of the Foreign Assistance Act of 1966.

The Agency for International Development has made a series of five-year grants, each of them specifically oriented to increasing U.S. institutional response capabilities in a particular field or problem of mutual interest. Selections have been made on the basis of the relevancy of demonstrated competency in priority fields of activity and the degree of long-term commitment a university is willing to offer the program. By the terms of these grants the universities do not usually provide specific services but use the funds to develop capacities which can be utilized through separate arrangements by AID, other donors and directly by developing countries.

This directory of 211(d) grant institutions, valid as of October 1974, includes the names of colleges and universities which could be useful when considering the following activities:

- Placing undergraduate, or non-academic students for specialized types of training relevant to developing nations.
- Planning workshops on specific subjects.
- Seeking specific technical and professional information.
- Seeking research talents or consultants for specific problems.
- Seeking resources for technical assistance projects.
- Problem identification and analyses.
- Program/project design.
- Evaluation

The grantees are grouped according to subject matter. However, some areas of competence cut across classification areas, and the reader may need to look under several subject matter headings to locate all the expert skills and knowledge in a field of interest or problem area.

To facilitate communication the directory provides the name of the university program grant director as a reference point and source of information. Additional information about specific grant programs can be obtained directly from the sponsoring technical office in the Agency for International Development, Washington, D.C., 20523, which is also included.

The directory is designed to be a useful tool for a broad spectrum of planners and practitioners in national development: A.I.D. Missions, development banks, foundations, international organizations, and the like. It is intended to identify the location of technical and professional resources. It is not aimed, however, at being an exposition of research findings nor a list of accomplishments by the grantees. Its sole purpose is to provide information about educational and human resources available to those engaged in developmental assistance programs. It is updated periodically to add new grantees.

The report replaces the June 1972 edition. It has been updated and edited by Dr. Charles J. Dove of the Planning, Analysis and Utilization Division of the Office of Research and Institutional Grants with the cooperation of all of the universities involved.

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International Agricultural Economics

Six U.S. universities have formed an International Agricultural Economics Panel, with each of the six providing services and training in areas of somewhat differing but interrelated aspects of agricultural economic development. The following table lists each institution's functional areas of concentration and the geographic regional emphasis of its programs.

University	Field of Technical Concentration	Geographic Concentration
Cornell	International agricultural trade Market structure & development Sector analysis: employment	Asia Asia & Latin America Asia (India)
Iowa State	Sector analysis and planning Employment & income distribution Land and water resource use Interrelationships between agriculture and overall economic development	Latin America (but not limited to that geographic region)
Michigan State	Sector analysis: simulation Employment generation Trade & diversification Marketing systems	East Asia & Africa Africa East Asia & Africa Latin America
Minnesota	Technical change & development Labor markets Commodity markets and trade	Asia & Latin America Asia & Latin America Asia
Southern University	Unemployment & under-employment Human resource development	French West Africa
Virginia State College	Rural development Small farms and small businesses	To be determined

The six universities represented on the Panel have agreed to make available up to a total of twenty-eight man-years of university talent to AID over the

period of the grants. Assignments, often in close collaboration with USAID Missions, have been completed or are being carried out in countries in nearly every part of the world, as well as providing support to activities of the agricultural economics division of AID's activities in Washington. Short-term assignments under the talent-sharing program are available to USAID missions. An important component of the program is the assistance provided to carry out thesis research in developing countries with adequate supervision by major professors.

These grants are managed by the Technical Assistance Bureau's Office of Agriculture at the Agency's headquarters in Washington.

INTERNATIONAL AGRICULTURAL TRADE CORNELL UNIVERSITY

Grant Program Director: Dr. B. F. Stanton
Department of Agricultural Economics
New York State College of Agriculture
Cornell University
Ithaca, New York 14850

Departments Involved: Department of Agricultural Economics and Office of International Agricultural Development.

Advanced training and research capabilities of the New York State College of Agriculture are already established. The 211(d) grant is primarily directed to expanding the graduate curriculum, opportunities for field research and faculty resources to meet the increasing demands on them for service to developing countries. A major use of these funds is to enable graduate students to undertake field research in overseas projects overseas.

The Cornell program in agricultural economics is problem-oriented. Study and research concentrate on sector analysis in the functional areas of international agricultural trade, market structure and development, and rural employment, with specific application to problems of Asian and Latin American countries.

The Department has a resident faculty of 37 members advising both undergraduate students and approximately 90 graduate students. About a third of the latter are working on degree programs related to development, trade and price policy. International

activities are funded in part by the State of New York, which, with the Department, encourages research and off-campus educational activities for both faculty and students.

The graduate student body with primary interest in international issues in agricultural economics is broadly multinational. In a recent year this included 10 students from Southeast Asia, 5 from Africa, 10 from Latin America as well as a group from Western Europe and the English speaking world. At that time seven students were overseas collecting data for Ph.D. theses in a developing country on a project jointly determined by faculty at Cornell and research staff at the field location.

Instructional Resources Courses specifically relating to international agricultural economics and development, available at the graduate level, include the following:

Economics of Agricultural Geography
Economics of Agricultural Development
Food, Population and Employment
Seminar on Latin American Agricultural Policy

Seminar on Economics of Agricultural Development
Seminar on Agricultural and Economic Planning Models
Administration of Public Agricultural Programs

Seminars, workshops and lecture series on various phases of the subject area, are presented annually, often by visiting professors.

The Department maintains active relationships with a number of scientists in developing countries. As a feature of these relationships a number of students working on Ph.D. projects overseas are assigned to a host university of a government agency. In addition, various visiting scholars from abroad are in residence each year at Cornell and are available for special consultation.

Research Resources Formal research involving both faculty and graduate students in the Department covers a wide variety of topics. In a recent year such research subjects included the following:

- Economic analysis and evaluation of food and nutrition intervention programs
- Analysis of price-demand-supply behavior for selected agricultural products
- Mexican agricultural policy
- Economics of tropical agricultural commodities
- Impact of new agricultural technology on rural employment and income
- Resource productivities and farm output response in Latin American agriculture
- Employment and welfare in developing countries
- Food policy planning in low-income countries
- The rise and stabilization of human populations
- The role of agricultural trade and transportation in the process of economic development

Funds for research are sought from a wide number of sources. Graduate students, who

are supported by fellowships or scholarships from national governments, international organizations or major foundations, commonly must obtain additional funding to carry out a Ph.D. project in the field overseas. Whenever possible the initial grantor of student support participates in funding such thesis work. But the marginal increment of funding is often difficult and critical. This is one of the areas in which 211(d) grant funds have been used, particularly where the overseas research is related to other work of faculty in the department financed in whole or in part by funds from USAID.

Currently two projects are being completed which were partially funded with 211(d) funds involving substantial overseas field study. A study of employment and comparative advantage in a rural area of Java was conducted in cooperation with the economics faculty at Fadjah Mada University, Jogjakarta, Indonesia. This involved an input-output study relating resource endowments and factor intensities of production with trading patterns and regional payments balances. A two year field study in Uganda jointly sponsored by the Makerere University Institute of Social Research and this department is nearing completion. Funds from the Rockefeller Foundation and the National Research Council of Uganda provided part of the support. The interactions between urbanization, population growth and labor utilization in a densely populated district were studied. Employment opportunities and flows between rural and urban areas were documented. The capacity of present agricultural systems to absorb labor were investigated.

Three projects which focus on various aspects of international trade, balance of payments issues and employment in the agricultural sector of Nepal are being conducted with 211(d) funding under the direction of Professor D. G. Sisler. In this case all the research efforts have been integrated with government officials in Nepal and faculty at Tibhuvan University in Kathmandu. Logistical support and advisory assistance is also being provided by cooperating professionals in USAID and I.B.R.D.

It is departmental policy that every effort be made to assist Ph.D. students to conduct field research in overseas settings. In all such cases a faculty member or senior research associate supervises and coordinates work at the location selected. Grant funds assist in implementing this policy.

In some cases graduate students participate in parts of a major program such as the one directed by Professor Mellor on the impact of new technology on rural employment and income. Here research monies come from a primary contractual source. They are supplemented by State sources. Students elect whether or not to join the project and carry on some part of the larger program. In a few cases students develop a project which is particularly appropriate to needs of their country and future professional activities when they return. Whenever possible the faculty tries to help develop such initiatives particularly when there are strong professional resources in the country to assist in directing the thesis proposal.

A variety of collaborative arrangements are worked out with institutions in developing countries. A recent example of this is now being developed with the University of Ibadan, Nigeria and the International Institute of Tropical Agriculture. Cornell recently completed a 20 year relationship with the University of the Philippines, College of Agriculture at Los Banos, as an inter-university program to increase proficiency in instruction and research. Other special projects involving inter-institutional relationships are in progress in Malaysia, Indonesia, Taiwan, Ceylon and Thailand.

Information Resources The agricultural Library at Cornell is the second largest in the United States, exceeded only by the Library of the U.S. Department of Agriculture. The International collections for China, Southeast Asia, India and the Andean region of Latin American are especially noteworthy. The College has an unusual collection of statistics, periodicals and historical data concerning the evolution

of trade in developing countries; the unique Wason Collection provides extensive background information for most Asian countries.

In addition, Cornell has outstanding facilities for teaching languages. Training in Vietnamese, Burmese, Thai, Indonesian, Classical Chinese, Tagalog and other Asian languages is available, and the Department of Linguistics has a world-wide reputation.

Cornell has also been noted for its very extensive publication of research papers on agricultural development problems through its International Agricultural Development Bulletin, Agricultural Economics Staff Papers, offprints of articles in professional journals, and proceedings of conferences and symposia. A 47-page List of Available Agricultural Economics Publications may be obtained by writing to the Department.

Interlibrary loans are available to cooperating institutions, but generally scholars are encouraged to come to the campus to work with special collections. Specific requests, however, may be addressed to the Cornell University Librarian.

Consulting Services A broad spectrum of specialized consulting interests is represented on the Department staff. Most particularly these interests include the following:

- International trade
- Agricultural price policy
- Employment and labor productivity in agriculture and other sectors
- Market development
- Rural employment and income distribution problems
- Efficiency in the use of land and water resources.

Experienced professional personnel are available for contractual consultation in the following additional specialized fields of interest:

- Farm management, organization and labor utilization
- Economics of human nutrition

Land economics, land reform, and settlement of "new lands"
Farm production economics and mechanization
Price policy, commodity markets, and pricing procedures
Agricultural development policy and financial institutions
Agricultural cooperatives and market development

Tropical farm management, farm records and surveys
Extension programs and financing
Agricultural development policy (South Asia)
Agricultural finance and financial institutions
Dairy marketing problems

AGRICULTURAL SECTOR ANALYSIS & PLANNING IOWA STATE UNIVERSITY

Grant Program Director: Dr. John Timmons
Department of Economics
Iowa State University
Ames, Iowa 50010

Departments Involved: Department of Economics and the Center for Agricultural and Economic Development.

Iowa State University's Department of Economics includes both general and agricultural economics and is administered jointly by the Colleges of Sciences and Humanities and of Agriculture.

The grant program at Iowa State emphasizes work in the relationship between agriculture and overall economic development, sector analysis and planning, rural employment and income distribution, and land and water resource use. Most of the research supported by the grant is accomplished through graduate students. While the program has been oriented to the Latin American scene, its competence is primarily functional rather than geographical, and can be applied in other areas.

The Department has well-developed linkages with international agencies. With the FAO it has participated in studies of rural employment and income distribution problems. With the OAS it has studied the relation of changes in income distribution in Latin America to food demand. It has also participated in studies with the OECD Development Center in Geneva, with the ILO, and with the World Bank.

Instructional Resources Current titles of graduate-level courses on economic and agricultural development of an international character are as follows:

Economics of Underdeveloped Nations
Economics of Agricultural Development
International Economics
International Finance
Agrarian Reform and Economic Development
Economic Development and Transformation of Agriculture
Agriculture in the World Economy
Advanced International Economics
Advanced International Finance
Economic Development and Growth
Advanced Economic Development and Growth
Theory of Quantitative Economic Policy

Special seminars and programs have added significantly to the instructional resources in international agricultural development. About 60 graduate students have a primary interest in economic and agricultural development. Roughly, a third of them come from Latin America, a fifth from the United States, and the remainder from a variety of countries in Asia and Africa and southern Europe. Grant

funds support research of seven of the graduate students. Their research emphasizes the effects of technological change on input requirements within agriculture, including employment effects and the derived income distribution implications, and also sectoral employment and the rural-urban migration.

A normal pattern for individual support from 211(d) resources is a two-year appointment as a half-time research assistant which includes a year abroad gathering research data.

Research Resources Faculty research in economic and agricultural development at Iowa State is organized into areas. The most important concern unemployment and underemployment, agricultural sector analysis, and the intra- and inter-sectoral relationships in the development process. Many of these research interests concentrate on Latin America conditions.

The most substantial activity is the Iowa-Peru program supported by AID and initiated in 1962. It currently involves a team of economists in residence in Peru working with several government ministries, the National Planning Institute, the Agrarian Reform Institute, the Office for Evaluation of National Resources, the Central Reserve Bank, and the National Agrarian University. This work has resulted in more than forty publications, with special emphasis on the agricultural sector, particularly in reference to the new agrarian reform law, the five-year agricultural development plan, marketing studies, and projections of economic variables.

Other faculty research includes agricultural sector studies in Panama (with the USAID mission and the National Planning Council) and Uruguay (sponsored by the Inter-American Development Bank). In Guatemala two faculty members worked with the National Planning Council on determining agricultural development priorities, issued a special report on vegetable production and marketing, and analyzed potentials for crop diversification. In cooperation with USAID, four Iowa State staff previously prepared a work on *The Role of Agriculture in Guate-*

mala's Economic Development (Iowa State University Press, 1970). In Mexico, Iowa State had a team of agricultural economists, economists and statisticians during 1965-70 under a Ford Foundation grant, and follow-up activities are now going forward with the National Agrarian University at Chapingo and with a summer project with the Ministry of Agriculture on production and marketing of wheat, oil seeds, and lime oil. Special studies are also in progress regarding sectoral employment and technical change in Colombia, and on employment implications of economic integration in Central America. A variety of region-wide studies have also been undertaken and presented in papers to various international agencies and conferences.

Outside of Latin America, Iowa State faculty studies have included rice marketing in Indonesia and the Philippines (on a contract with USAID) and economic technical assistance in Tunisia.

At the graduate level, dissertation research generally coordinates with the research interests of the student's major professors or reflects student interests in his country of origin. The bulk of dissertation topics falls into three interrelated themes: (a) employment creation and income distribution, (b) agricultural and economic development problems in Latin America with emphasis on intra-sectoral effects, and (c) analysis of the role of food aid in economic development.

Information Resources Iowa State's library resources on both economic and agricultural development are especially rich in materials relating to Latin America. Standard interlibrary loan arrangements facilitate the sharing of these materials with other cooperating institutions.

A list of publications, conference papers, and reports based on staff research in economic and agricultural development may be obtained from the Department of Economics. About a dozen such titles were produced in 1972-73, mainly in the following categories: (a) unemployment, underemployment and income distribution studies; (b) specific agricultural sector analyses of different Latin

American countries leading to policy recommendations for agricultural development and planning; and (c) land tenure and water resources studies. A large number of specific studies relating to Peruvian agricultural development and planning have been completed under the Iowa-Peru project, and a separate list of them is available.

Consulting Services Iowa State faculty has participated in a variety of overseas research and consulting

services, particularly in Latin America. Several such assignments have included sector analysis or reviews of a sector analysis. Another set of consulting activities relate to macro studies of unemployment and underemployment, particularly in consultation with international agencies (IBRD, IDB, FAO). Another area of consulting has been in the field of marketing. Professional personnel are also available in other areas of economics and agricultural economics as described above under Research Resources.

AGRICULTURE & ECONOMIC DEVELOPMENT MICHIGAN STATE UNIVERSITY

Grant Program Director: Dr. Harold Riley
Department of Agricultural Economics
Michigan State University
East Lansing, Michigan 48824

Departments Involved: Department of Agricultural Economics, College of Agricultural and Natural Resources.

Michigan State University is heavily committed to graduate training in international economic and agricultural development. Generally about half of the approximately 100 graduate students in the Department of Agricultural Economics come from more than 20 countries outside the United States.

Research and consulting activities in international agricultural development are coordinated through the Dean of International Programs and Instrumented through an Institute of International Agriculture.

Michigan State University is one of the charter members of the Midwest Universities Consortium for International Activities (MUCIA), and various members of the Department of Agricultural Economics have participated in MUCIA activities, particularly in Brazil and Indonesia, in post-overseas assignments and in the sponsorship of thesis research.

Instructional Resources Graduate work in agricultural economics at MSU is complemented by strong instructional resources in various interrelated disciplines. In addition, graduate students can draw on the resources of the area studies centers, language training facilities, and the professional reservoir of overseas experience. A number of graduate students have been able to do field work abroad for their Ph.D. theses, particularly in Colombia, Nigeria, Pakistan, and western Europe (on European Common Market problems).

Graduate courses related to development are offered in agricultural economics, economics, political science, and sociology. The following course titles are illustrative:

Agriculture in Economic Development
Economic Development of Tropical Africa
Agricultural Administration: Design and Implementation of Development Policies
Rural Development Administration
Workshop in Agricultural Planning
Land Problems and Policies

A new undergraduate curriculum in Public Affairs Management offers a variety of courses at the pre-professional level, which can be drawn upon by the beginning Master's candidate. These include:

Community Economics
World Food, Population, and Poverty
Social Accounts and Community Choice
Land Economics
Rural Transformation in Developing Societies
Introduction to Systems Analysis.

At the graduate level, students are encouraged to take at least half of their course work outside of the Department. A new concentration in Public Administration of Agricultural Programs is being developed jointly with the Department of Political Science.

A variety of research workshops, special seminars, departmental seminars, and seminars of graduate students on thesis research findings held either at our university or at overseas locations provide additional instructional resources.

The grant provides support for several U.S. and foreign graduate students who are clearly committed to careers in international development. This is particularly true of such students who are nearing the completion of their academic work and need help in financing in-country dissertation research where appropriate arrangements can be made with host country institutions.

Research Resources Current and recent faculty research emphasizes the analysis of such problems as marketing improvement in Latin America, sector analysis, the impact of the European Common Market on agriculture, employment problems in rural Africa, and agricultural policy and planning in low-income countries. Geographic interest in research activities extends from West and Central Africa to Latin America (particularly Colombia and Brazil), and to South and East Asia (especially Pakistan, Bangladesh and Korea).

One senior staff member was engaged for

more than eight years in research on the agricultural development process in Tropical Africa with emphasis on planning and policy analysis, including research concentrated on problems of unemployment and options for absorbing more labor in agriculture in Zaire, Ghana, Nigeria, and Sierra Leone. A report for AID's Africa Bureau, *Employment Generation in African Agriculture*, was published in 1970, later reprinted, and has since been translated into French and Spanish. This research, with AID support, is now directed at developing a network of researchers linking African and American scholars on a common program.

Another senior faculty member has conducted extensive research in Nigeria on policy and sector analysis. Since then, under AID sponsorship, he and a group of associates have developed a computerized simulation model which greatly reduces the cost of a comprehensive sector analysis. The work has been applied in Korea and continues to be used in Nigeria. A team of MSU associates and FAO advisers has worked with a committee of Nigerians in developing and evaluating data and choices for assisting the Government of Nigeria in defining the agricultural development portion of the second national plan.

Several faculty members, along with colleagues in the College of Business and Public Service, have concentrated on the modernization of agricultural marketing systems in Latin America. Reports have been issued for Puerto Rico, Northeast Brazil, Bolivia, and Colombia. The Latin American Marketing Program (LAMP) has coordinated this work with AID sponsorship. Also with AID support an interdisciplinary program on agricultural development administration problems has been initiated, with a first application in Latin America, jointly with the Inter-American Institute for Agricultural Science (IICA).

Joint research with the Agricultural Engineering Department has concentrated on systems of agricultural mechanization, first in Africa and later in Southeast Asia. The latter work has produced a number of research papers.

A wide variety of research contracts and consultative arrangements are carried forward with AID, FAO, the World Bank, and the U.S. Department of Agriculture, as well as with programs sponsored by the Ford, Rockefeller, and Kellogg Foundations. Much of this work is conducted jointly with specific regional or host country institutions, particularly in West and Central Africa, Colombia, Korea, and with IICA in Costa Rica.

The range of graduate student research interests are reflected in the following list of current or recent dissertation assignments in international agricultural development:

- Production and marketing of cotton with special emphasis on labor absorption (Zaire)
- Economics of Dwarf Wheats on Smallholder Farms (Hazara District, West Pakistan)
- Alternative methods of rice production and processing (Northern Ghana)
- Economics of Alternative sources of milk products in Tanzania, and the dairy industry
- Determinants of rural to urban migration in Uganda
- Economics of smallholder rubber production (Malaysia)
- Labor absorption impact of eliminating price distortions in agriculture in West and Central Africa
- Farm management production economics in West Africa
- Role of the multi-national firm in national development
- Reorganization of Cali Food retailers' procurement activities through a central wholesale marketing facility (Colombia)
- Effect of rapid increase in agricultural output on employment and income distribution (Tanjore District, India)
- Western Nigerian cocoa, a simulation project
- Agricultural mechanization in Ethiopia: economic analysis
- Potentials for increased taxation from agriculture in India

- Input supply for rapid agricultural growth in Iraq
- The thana irrigation program in East Pakistan
- Modifications for effective agricultural credit in Ceylon
- Postwar strategies for the rice sector in Vietnam
- Coordination and training in West Pakistan agricultural extension service.

Information Resources Collections of literature about various aspects of international development are maintained by the International Section of the Main Library. These materials are accessible by inter-library loan, or through copy service if the loan of originals is not possible. Inquiries should be addressed to the International Section of the MSU Main Library.

The Department of Agricultural Economics maintains collections of specialized materials and bibliographies on a number of subjects including:

- The impact of Food for Peace programs
- Agricultural marketing in Puerto Rico, Brazil, Colombia, and Bolivia
- Unemployment in West and Central Africa
- Agricultural development administration
- Agricultural development in Pakistan
- Simulation models of the agricultural sector

The Department issues research reports under the Agricultural Economics Report Series. Publication lists are mailed to a wide range of institutions and individuals. Separate monographs are issued when major research studies are completed. Fourteen technical reports of the marketing study conducted in Colombia, printed in Spanish, are available on a loan basis. Final reports from the LAMP center studies in Latin America are printed in both English and either Spanish or Portuguese. Copies of most of the items above are available upon request. Address inquiries to the Reference Librarian, Department of Agricultural Economics.

The simulation contract, supported by AID, is developing a "software library" by which to analyze investment priorities and alternative policies. For information on the use of these computer procedures, write to Professor Glenn Johnson.

Consulting Services The Department of Agricultural Economics supplies consulting services to both bilateral and multilateral development agencies. The research programs, already indicated, are one procedure by which these services are made available. Illustrative advisory services in developing countries include helping develop a statement of national policy

for food marketing, consultation on agricultural research priorities and agricultural policies, planning agricultural sector analysis, and developing seminars on agricultural sector simulation models.

The faculty of the Department has focussed on policy problems in developing countries. Its members have extensive experience on matters of agricultural sector analysis, government price programs, the development of marketing institutions, and employment problems of rural people, as well as on international agricultural trade and potential export markets and on the interrelationships between farm and nonfarm communities and the outside world.

TECHNICAL CHANGE AND DEVELOPMENT UNIVERSITY OF MINNESOTA

Grant Program Director: Dr. Martin E. Abel
Department of Economics,
Department of Agricultural and Applied Economics, and
Economic Development Center
University of Minnesota
St. Paul, Minnesota 55101

Departments Involved: Department of Economics, College of Liberal Arts and Department of Agricultural and Applied Economics, Institute of Agriculture; Economic Development Center (a joint activity of two departments); Center for Comparative Studies in Technological Development and Social Change; Office of International Programs.

Minnesota's Economic Development Center was established in 1967 as a joint activity of the Department of Economics and the Department of Agricultural and Applied Economics one of several centers and programs organized under the Office of International Programs. The principal objective of the Center is to facilitate the research interests of graduate students and faculty in the two departments who have a career interest in development economics and policy. The Center's program is closely linked with several

other units of the University which have a strong orientation to international development, such as the Center for Comparative Studies in Social and Technological Change and the Office of International Agricultural Programs.

The 211(d) grant has enabled the University to add two new senior positions to the combined resources of the two departments in the field of development economics, and has enabled the Economic Development Center to expand its research program and broaden the range of consulting services.

Participation in the Center's program by appropriate government officers and scholars from developing countries is specifically encouraged. Nearly a third of the graduate degrees in economics and agricultural and applied economics are currently being awarded to foreign students.

Instructional Resources In addition to standard courses generally common to graduate study in international economic and agricultural development, several new courses and seminars are now being offered. These include:

- Seminar on Human Capital
- Economic Growth and National Planning (models of the process of economic growth, techniques useful in planning, and questions of policy)
- Agricultural Prices and Trade Seminar
- Seminar on Agricultural Development (now expanded into a workshop that meets throughout the year)
- Advanced Topics in Economic Development

A series of weekly workshops sponsored by the Economic Development Center is now held throughout the year; participants and discussants are chosen from among principal foreign and American scholars with particular responsibilities in the international subject areas. The sessions add important dimensions to the instructional resources available to advanced students.

The program of the Department of Agricultural and Applied Economics has also been extended to encompass a small number of non-degree advanced students for whom special programs have been tailored to meet their particular professional needs. These individuals come to the University with graduate degrees and have an interest in specific courses or a special interest in working with a senior member of the staff in a particular subject area. These special non-degree programs have included persons from India, Korea and Thailand.

While the Department has no scholarships available to foreign students, opportunities for financial support exist through graduate assistantships. Economic Development Center funds are available to foreign and U.D. students at the thesis level, using AID, SEADAG, and Ford and Rockefeller Foundation grants. These assistantships have supported approximately thirty-five students during the

past eight years in the Department. Foreign students and their families receive a variety of special services from the following University agencies:

- Office of Foreign Student Advisors: meeting on arrival, housing, counseling
- International Center: orientation, language classes
- Department of major study: faculty advisor to assist in course work and thesis planning, counseling
- Graduate Student Club, Department of Agricultural and Applied Economics: assistance during orientation.

Instructional resources of the two departments are each year significantly enriched by a number of visiting professors.

Research Resources Major research effort at the Economic Development Center and its two inter-linked departments has been concentrated in four areas of significance to the developing economies: (1) population and labor markets, (2) commodity markets and trade policy, and (3) technical change and resource use, and (4) trade and development: inter-regional and international. However, the program of the Center is not limited to these four areas. For example, work has been initiated in the areas of sector analysis and planning population economics and policy, and public enterprises.

Special capabilities within the Department of Agricultural and Applied Economics include research specialization in (a) generalized development theory, (b) technological change in agriculture, (c) resource economics, (d) public finance, (e) econometrics, (f) agricultural price and trade policy, (g) international trade and economics, (h) human capital, and (i) regional analysis and sectoral policies.

The following list of current or recently completed research assignments of faculty in the two departments and of visiting scholars and graduate research assistants aptly illustrates the range of the University's research commitment to the intent of the 211(d) grant:

Regional Development in Argentina
 Dualism in Labor Markets in Developing
 Economies (Asia and Latin America)
 Labor Markets in Japan and Brazil
 Turkish Workers at Home and Abroad
 The Cost of Protectionist Sugar Policies
 Biological and Mechanical Technology on
 Small Farms, Mexico
 Induced Innovation in Agricultural De-
 velopment (Japan and U.S.)
 Agricultural Mechanization in Latin
 America (Brazil)
 Study of Unit Costs of Wheat Production
 in Punjab, India
 Induced Technical Change and Agricultural
 Development in Eastern Europe
 Productivity Growth in Korean Agriculture
 Technical and Economic Constraints on
 Livestock Production in Thailand
 Impact of P.L. 480 Shipments in Brazil
 Economic Growth and Individual Income
 Distribution (Colombia)
 Disaggregated Demand and the Pure
 Theory of International Trade for
 Domestic Consumption (Colombia)
 Welfare Costs of Commercial Policies in the
 Argentine Automobile Industry
 Economics of Gravity Irrigation in the
 Philippines
 Economic Development and Food Demand
 Demand for Fertilizer in Korea
 Demand for Tractors in Brazil

In addition to research spin-off from the
 University's inter-institutional programs in
 Tunisia and Argentina (see "Consulting Ser-
 vices"), extensive faculty and graduate research
 is also being carried forward in Thailand,
 India, and through various agencies in the
 United States. As to the latter, one staff mem-
 ber is engaged in a major research project on
 "Exchange Control, Liberalization, and Eco-
 nomic Development" at the National Bureau
 of Economic Research. Another was involved
 in an extensive analysis of "Foreign Invest-
 ment and Renewable Natural Resources,"
 with special emphasis on comparing overseas
 investment policies of the U.S. forest industry
 with those of developing countries, in a
 project supported by Resources for the

Future, Inc. Another member of the Depart-
 ment of Agricultural and Applied Economics
 has been engaged in a major study of the
 world's fats and oils market, which, with
 collaborators, has resulted in a book on *Soy-
 beans and Their Products: Markets, Models
 and Policy* (University of Minnesota Press,
 1971).

In India two members of the Department
 have worked with the Ford Foundation, one
 having completed a two-year assignment as
 program advisor in economics for the Founda-
 tion, the other as a researcher on the eco-
 nomics of improving village irrigation systems
 and as a teacher in resource economics at the
 Indian Agricultural Research Institute. Major
 objectives of the program were threefold: (a)
 to develop a program of training and research
 for state and central government personnel in
 investment planning, (b) to strengthen eco-
 nomic research in the Ministries of Agri-
 culture and of Foreign Trade, and (c) to
 develop a research program in regional agri-
 cultural development planning and evaluation.

In Thailand an active research program on
 the production economics of advances in rice
 and corn production technology has been and
 continues to be carried forward through the
 auspices of the Rockefeller Foundation at
 Kasetsart and Thamassat Universities. Within
 this framework UM graduate students have
 conducted their thesis research.

Information Resources With a collection of
 nearly three million
 volumes, the University of Minnesota Library
 now ranks as one of the largest university
 libraries in the country. Collections in the
 international field are located primarily in the
 Wilson Library in Minneapolis and in the St.
 Paul Campus Library. The former includes the
 Ames Library of South East Asia and the East
 Asian Library. The Hill Reference Library in
 St. Paul also has specialized collections, as do
 both the Economics and Agricultural and
 Applied Economics Departments. Through
 Interlibrary Loan Service the University of
 Minnesota Libraries share their resources with
 other institutions.

A considerable variety of research and discussion papers, articles, monographs, etc., written by staff members and associates in the field of international development, is produced and distributed in several ways. The Economics Department Center has a Reprint Series of significant articles written by staff and published by professional journals of economics.

A series of in-depth Staff Papers, produced in connection with professional conferences or for particular agencies, since 1968, is also published. Although copies may be obtained either from authors or from one of the two departments, inquiries may be channeled through the Economic Development Center. Titles of the Staff Papers thus far produced include:

Optimum Patterns of Agricultural and Industrial Development for a Small Economy
 Developing Strategy for a Medium-Sized Economy
 Growth with Unemployment in Latin America: Some Implications for Asia
 Induced Innovation and Agricultural Development
 Wage Structure in Latin America
 Johnson and Johnson on Sugar Policy
 Technology Transfer and Agricultural Development
 Wages Under Conditions of Surplus Labor in Japan
 Agricultural Modernization in Market and Planned Economies: The German Experience
 Induced Innovation: A CES-Type Meta-Production Function
 Perspective on the "Green Revolution" in Asia
 The Economics of Malnourished Children: A Study of Disinvestment in Human Capital
 Livestock Projections by the Technique of Flow Charts
 Some Market Effects of Agricultural Development on Functional Income Distribution in Developed Countries

Industrial Capacity Utilization in Colombia: Some Empirical Findings
 Investment in Human Capital Under Uncertainty
 The Demand for Cotton in India, 1952-1968
 A Competitive Market Model for "Futures" Price Determination
 High Returns from Field Channels in Irrigated Indian Villages
 Economic Development, Structural Change and Employment Potential
 The Developing Countries and United States Agriculture
 The Measurement of Biased Technical Change in the Many Factor Case: U.S. and Japanese Agriculture
 Induced Innovation: A Critical Review of the Theory and Conclusions from New Evidence
 The Supply of Money and Bank Credit in Argentina
 The Economics of Olive Oil and Oilseeds in the Mediterranean Region
 Exploration and Analysis of Producer Prices of Olives in Tunisia A Case of Pricing Imperfection
 An Appraisal of the State Bank of India
 Economics of Technical Change in Wheat Production in Punjab (India)
 Technology and Agricultural Diversification
 Relative Efficiency in Wheat Production in the Indian Punjab
 Sources of Agricultural Growth in Japan, 1880-1965
 Economic Factors Affecting Population Growth: A Preliminary Survey of Economic Analyses of Fertility
 Technology Transfer, Institutional Transfer, and Induced Technical Change in Agricultural Development
 An Alternative Approach to the Theory of Labor Supply in LDCs
 Technical Change in Agriculture
 The Economic Structure of Murethi Village
 Science for the Farmer: The Development of the Minnesota Agricultural Experiment Station, 1868-1910

Productivity Growth in German Agriculture: 1850 to 1970, and Appendix Data on Productivity Growth in German Agriculture: 1850 to 1970

The Measurement of Technical Change Biases with Many Factors of Production Technology and the Agricultural Output Mix

A Cost Function Approach to the Measurement of Elasticities of Factor Demand and Elasticities of Substitution

A Microeconomic Approach to Induced Innovation

A full "List of Faculty Publications in Agricultural and Applied Economics," with more complete citations, is available from that Department.

Copies of recent Ph.D. dissertations completed under Economic Development Center sponsorship may be purchased from University Microfilms Ann Arbor, Michigan. They include:

Lawrence B. Morse, *The Peruvian Experience with Fixed and Flexible Exchange Rates: An Empirical Examination*, 1968

V. S. Rao, *Disaggregated Demand and Some Aspects of the Pure Theory of International Trade*, 1968

Eduardo Sarmiento, *Efficient Allocation of Resources in the Supply of Water for Domestic Consumption. Colombia*, 1971

Sung Hwan Ban, *Long-Run Productivity Growth in Korean Agricultural Development, 1910-1968*, 1971

Aida Eguia Recto, *An Analysis of the International Demand for Philippine Coconut Products*, 1971

Edgardo E. Barandiarán, *The Control of Money and Bank Credit in Argentina*, 1972

Alvin John DeBoer, Jr., *Technical and Economic Constraints on Bovine Production in Three Villages in Thailand*, 1972

Peter Greenston, *The Food for Peace Program and Brazil: Valuation and Effects of the Commodity Inflow*, 1972

Terry Monson, *Migration, Experience-generated Learning and Infant Industries: A Case Study of Turkey*, 1972

Enrique O. Scala, *The Efficiency of Import Substitution in the Argentine Automotive Industry*, 1972

Surjit S. Sidhu, *Economics of Technical Change in Wheat Production in Punjab (India)*, 1972

Francisco E. Thoumi, *A Theory of International Trade of Used Durable Goods with an Application to Underdeveloped Countries*, 1972

Remigio D. Torres, *Potential Benefits and Pricing of Irrigation Water: A Case Study of the Santa Cruz System*, 1972

John H. Sanders, *Mechanization and Employment in Brazilian Agriculture, 1950-1971*, 1973

Mitoshi Yamaguchi, *Technical Change and Population Growth in the Economic Development of Japan*, 1973

Sachiko Yamashita, *An Exploration of the Economics of Taste and Demand for Food*, 1973

William W. Wade, *Institutional Determinants of Technical Change and Agricultural Productivity Growth: Denmark, France, and Great Britain, 1870-1965*, 1973

Bai Yung Sung, *The Demand for Fertilizer in Korea*, 1974

Michael J. Hay, *An Economic Analysis of Rural-Urban Migration in Tunisia*, 1974

The Economic Development Center also issues, in printed form, an extensive Annual Report which, among other things, provides a series of "Center Research Reports" and greater detail on related projects and programs, Center publications, and workshops and seminars.

It should also be noted that Minnesota is one of five universities associated in MUCIA (The Midwest Universities Consortium for International Activities, Inc.) through which overseas research programs and library programs are coordinated. The MUCIA program

also entails international classwork preparation to strengthen instruction in international development.

Consulting Services In addition to research-oriented consulting assignments in India and Thailand and with several U.S. agencies, already mentioned in the research subsection of this report, staff members of the grantee departments are widely dispersed among a number of countries and agencies. Recently eight members of the Economics Department have been involved in assignments in Chile, Argentina, Brazil, Colombia, Tunisia, Turkey, India and Japan. In the Agricultural and Applied Economics Department, seven staff members have recently consulted in Argentina, Tunisia, Morocco, Nigeria, India, the Philippines, Indonesia, Saudi Arabia, and Korea, and one member of the staff carried out a year's assignment with the AID Technical Assistance Bureau in Washington as a part of the activities made possible by the 211(d) grant.

One of the University's major consulting arrangements is a joint venture of the two departments in Tunisia. The Tunisia program is designed to develop staff and provide training for a Bureau of Economic Studies, and to provide instruction in the Faculty of Law and Economics at the University of Tunisia. Four UM staff members are currently located in Tunisia, while several on the campus at Minnesota provide team support and visiting lecturers for the Tunisian university.

Another major long-term consulting arrangement, this one in Argentina, was sup-

ported by the Ford Foundation. The main objective of the Argentine Agricultural Economics Project was to help develop the profession of agricultural economics in that country. The first students from Argentina initiated their studies in 1965. Each Fellow in the program was sponsored by an Argentine institution (university, research center, or government agency) and was committed to work for his sponsoring institution upon completing the Ph.D. degree. His doctoral thesis research dealt with problems of Argentine agriculture.

Training accomplishments to date have included completion of twenty-six Ph.D. degrees through 1973; five have terminated their training with M.S. degrees. An additional seven have completed their preliminary examinations. One staff member served as coordinator of the Project at the University of Minnesota, and another directed the project in Argentina.

The range of specialized consulting capabilities has already been indicated in the research subsection. Eighteen staff members are specifically interested in the international dimensions and applications of their disciplines. Their specialized capabilities cover agricultural prices, trade and marketing; development administration, public finance, and agricultural policy; regional economics and income distribution; forest economics, farm management and production economics; investment analysis and evaluation; economics of technical change; credit systems, land tenure, and other related elements of agricultural and rural development.

UNEMPLOYMENT AND UNDEREMPLOYMENT SOUTHERN UNIVERSITY

Grant Program Director: Dr. T. T. Williams
Office of the President
Southern University
Baton Rouge, Louisiana 70813

Department Involved: Departments of Agricultural Economics and of Economics, and Office of the President.

This grant program, cannot be detailed at this juncture since its implementation and

detailed characteristics are now being evolved. The 221(d) grant, however, is intended to strengthen the two Departments through adding staff, providing student fellowships, developing seminar programs, and supporting

research activities. The grant program will also relate to the University's AID contract with a regional university development program in the Cameroons.

Substantively, the program will apply valuable domestic and African experience to problems of underemployment and human resource development in grass roots rural development, with special geographic attention to French and West Africa. The international effort will likely develop as one component of a total university program in rural development. The central focus will be on teaching and applied research including actual experimentation towards identifying viable options for increasing rural farm and nonfarm employment. The total effort in this important area will involve state funds, federal funds specially directed at applied re-

search by minority institutions, and AID support.

Southern University will also participate with five other U.S. universities to strengthen AID's capacities in agricultural economics with emphasis on developmental policy analyses or agricultural sector analysis. AID's intent in strengthening its capacities in agricultural economics relates to policy analysis needs in the LDC's involving short and medium term sector studies, closer linkages of LDC colleagues working towards advanced degrees and indigenous research needs, long term sector analysis designed to estimate the consequences of developmental policy alternatives on multiple goals and to increase the quality and relevance of research on issues of trade, diversification, rural employment, land use, and water resource use.

RURAL DEVELOPMENT VIRGINIA STATE COLLEGE

Grant Program Director: Dr. Huey J. Battle
Bureau of Economics Research and Development
Virginia State College
Petersburg, Virginia 23803

Departments Involved: Bureau of Economic Research and Development, and the Departments of Economics and Agricultural Economics

The grant program will aim to strengthen particularly the research function of the Bureau of Economic Research and Development and the instructional function of the departments involved in the interdisciplinary approach by the Bureau to the solutions of problems. The experience of the Bureau and the two Departments in working with small and low-income farmers and farm communities will thereby be given an international dimension.

The program will focus on managerial and growth problems of small farms and rural non-farm businesses which have minimal resources. The international phase of this university wide developmental program will be one component involving instructional and

applied research focusing on cooperating farms and small non-farm firms. The total program will receive state funds, federal funds directed at applied research by minority institutions on problems of the rural minorities, and AID resources.

During the initial years of the grant, Virginia State is collaborating with other U.S. institutions in meeting needs of LDC colleagues and institutions. It is intended that some of the same managerial and growth experiments conducted in Virginia will be tested in foreign locations after joint design and programming efforts with LDC colleagues. As with Southern University, a close relationship is developing with other U.S. universities involved in rural development programs. This relationship involves an exchange of professors and students, jointly designed and implemented research with LDC colleagues, participation in development workshops, and seminars.

Agricultural Development In India

Council of United States Universities for Rural Development in India (CUSURDI)

India's struggle to match food production to the needs of its rapidly multiplying population constitutes one of the massive efforts of modern times. In 1968 six American land-grant universities created an informal association (CUSURDI) in order to collaborate effectively while supporting their respective institution-building programs with Indian agricultural universities and institutes. For several years they simultaneously applied scientific methods to the study of some of the important food production problems and opportunities for Indian agriculture. Four of the six institutional members of the Council also maintained a direct relationship to Agricultural Production Projects with Indian agencies at state levels.

A separate AID contract provided (through Kansas State University) for an Executive Director and an office secretary for the CUSURDI's overall role. In this way CUSURDI is a whole coordinated activity under the modest five-year 211(d) grants to each of the six member institutions.

Within the overall CUSURDI framework, however, each member institution was individually responsible for its own specialized functional area of assignment and its relationships with Indian institutions and projects. These may be briefly summarized as follows:

University	Specialized functional area	Principal Indian Geographic area
Illinois	Plant pathology and crop disease	Utter Pradesh, Madhya Pradesh
Kansas State	Utilization of food grains	Andhra Pradesh and the Central Food Technology Institute at Mysore
Missouri	Breeding of agronomic crops	Orissa, Bihar
Ohio State	Soil-plant-water relationships	Punjab, Rajasthan
Penn State	Crop production and management	Maharashtra
Tennessee	Agricultural economics	Mysore, Madras

The general objectives of this collaborative interinstitutional effort were as follows:

1. To increase the capability of these six U. S. educational and research institutions to render assistance to developing nations and generate increased public awareness of the significance of the international service dimension of university education and research.
2. To increase the pool of manpower and capabilities of rendering assistance to developing nations.
3. To assist in the development of international service faculties in the Council universities and act as a catalyst to help expand interest in professional international service careers.
4. To encourage college students (undergraduate and graduate) to seek careers in foreign assistance work.
5. To use more effectively present U. S. field personnel in the development and training of candidates for professional service positions in developing countries.
6. To develop a core of experts in the various phases of agricultural development which will be available as consultants in the evaluation and solution of problems in which there is a national interest.

These were, of course, generalized concerns. Although the focus of the Council was specifically on Indian agricultural development, the land-grant methodology and approach was believed to have broad applicability to international development generally.

AID management of this series of grants was the responsibility of the Office of Technical Support in the Bureau for the Near East and South Asia. The Executive Director of CUSURDI was Dr. O. J. Scoville, 325 Waters Hall, Kansas State University, Manhattan, Kansas 66502.

PLANT PATHOLOGY UNIVERSITY OF ILLINOIS

Grant Program Director: Dr. J. B. Sinclair
Department of International Plant Pathology
University of Illinois
Urbana, Illinois 61801

NOTE: The grant was terminated December 31, 1973.

Departments Involved: Department of Plant Pathology and other departments in the College of Agriculture.

Indian Counterparts: Uttar Pradesh Agricultural University at Pantnagar, and the J. Nehru Krishi Vishwa Vidyalaya at Jabalpur.

The University of Illinois has been engaged in technical assistance to Indian agriculture since 1952 through a series of contracts with

AID and its predecessors. Staff members have provided about seventy man-years of service in India and more than 150 man-years of academic instruction to Indian students at Urbana. More than fifty faculty members have field experience in India. These factors plus an outstanding research library on the Indian sub-continent demonstrate a commitment to that part of the world, though it should be noted that other university relationships are established in Sierra Leone, Thailand, Indonesia, and Colombia as well.

The professor of international plant pathology, whose activities are partially supported by the 211(d) grant, served as campus coordinator of the CUSURDI program at Illinois and for a number of interdepartmental and interdisciplinary activities connected with it.

Several special research and development programs of the university are multidisciplinary in character. The purposes of the 211(d) grant were carried forward by the university not only in a program of international plant pathology but also in interdisciplinary and interinstitutional relationships and by encouraging motivated graduate students to undertake specific problem-oriented studies relating to the Indian scene.

Instructional Resources Most of the departments of the College of Agriculture provide courses with international agricultural content. The list of advanced courses in international agriculture is as follows:

- International Food Crops: Their Culture, Insects and Diseases
- Epiphytology of Plant Diseases
- The Evolution of Agricultural Economies Crops and Man
- World Animal Agriculture
- Special Topics in Horticulture
- Honors Seminar: International Problems Related to Agriculture
- Honors Seminar: Science, Food, and World Population
- Rural Social Change
- Social Change in Developing Areas
- Economies of Agricultural Development
- Land Economics
- Economic Development in Latin America
- Economic Development in India and Southeast Asia
- Economic Development in Tropical Africa
- International Comparative Agriculture.

A number of special seminars, particularly in the field of plant pathology and disease control, are annually presented both at the University of Illinois and at overseas institutions.

The graduate program in international agriculture normally attracts more student applicants than can be accommodated. However, in the Department of Plant Pathology a number of research assistantships, fellowships and scholarships are available to both U.S. and foreign students. Recipients are exempt from tuition and most fees at the University. Selection is based on academic achievement and ability to do research. The University maintains a Foreign Students Office to help with both university and government formalities, registration, housing, financial aid, and counseling.

Research Resources Various departments of the College of Agriculture are engaged in research in international agricultural development. Research in Plant Pathology is not only inter-related with that of other departments but also follows a generally coordinated pattern so that faculty and graduate research is interlinked. The research program of the department utilizes a newly equipped laboratory plus greenhouse and field plots. Most of the publications have to do with soybean production, systemic fungicides, root pathogens, fungal ecology and plant epidemiology. Abstracts of most of these studies are available from the Department.

Much of the research of the department centers on diseases of soybeans and their control. Soybeans were introduced as an oil and food crop in India through the two "counterpart" Indian institutions related to the Illinois program. The crop has a very high potential, particularly in supplying much-needed proteins to the Indian diet.

Information Resources The University Library's total collection now exceeds five million volumes plus over half a million pamphlets, 381,000 maps and aerial photographs, 389,000 microtexts, and more than 26,000 periodicals and newspapers. The Library cooperates with other universities in handling information requests through the interlibrary loan program.

The Agriculture Library has one of the outstanding collections of plant pathology literature, including both foreign and domestic journals and materials from many countries. One of the most significant geographic library units is the South and West Asia Library containing over 24,000 volumes on South Asia, plus collections on the United Arab Republic, Iran, and Indonesia.

A system of inter-university cooperation on information requests of a special character has been set up with particular overseas institutions, including Njala University College in Sierra Leone, the International Institute of Tropical Agriculture in Nigeria, Kasetsart University in Thailand and the American University in Beirut, Lebanon.

Offprints and abstracts of most research papers published by the Department are available on request.

Consulting Services Several senior staff of the Department of Plant Pathology, in addition to others who are completing graduate studies, are available for contractual consultation in soybean pathology or in plant pathology generally. Most of them have had direct experience in the agriculture of developing countries.

Other departments and interdisciplinary programs of the College of Agriculture maintain a variety of other consulting relationships.

UTILIZATION OF FOOD GRAINS KANSAS STATE UNIVERSITY

Grant Program Director: Dr. David R. Lineback
Department of Grain Science and Industry
Kansas State University
Manhattan, Kansas 66502

NOTE: The grant was terminated December 1973.

Departments Involved. Department of Grain Science and Industry, College of Agriculture; Food and Feed Grain Institute; South Asia Language Center; International Agricultural Office.

Indian Counterparts. Andhra Pradesh Agricultural University at Hyderabad; APP programs in Andhra Pradesh; Central Food Technological Research Institute at Mysore.

Thai Counterpart: Institute for Food Research and Product Development, Kasetsart University, Bangkok.

KSU has the only Department of Grain Science and Industry in the world. This Department, with its faculty and facilities, is the core of a Food and Feed Grain Institute which provides training, research and informa-

tion to the grain industries. The Institute brings together an interdisciplinary team of scientists for advanced research and development of the production, processing and marketing of grains.

International interests of the University have focussed primarily on India since 1956, and it has provided many faculty members in various disciplines to Indian institutions and programs. Well over a hundred Indian students, under the KSU/AID/-India participant training program, have completed academic work at Kansas State. KSU's contract to assist Andhra Pradesh Agricultural University has been terminated but during its active period an important component of the India program at the University was the South Asia Language and Area Studies Center. Since 1963 a "sister university" program, another AID agreement, has also been operated and staffed at Ahmadu Bello University in Nigeria.

The 211(d) program at Kansas State involved not only the Department of Grain Science and Industry, the Grain Institute, the South Asia Center, and the Indian counterpart institutions, but also other departments and offices of the University.

Instructional Resources The interdisciplinary character of the instructional program is apparent from the number of advanced courses provided not only in South Asian and tropical agriculture but also in South Asian social, linguistic and cultural studies conducted by other departments of the University. A representative listing of these, with the host department given in parentheses, is as follows:

Seminar in International Agricultural Development (Agricultural Economics)
World Nutrition (Foods and Nutrition)
Cultures of South Asia (Anthropology)
Introduction to the Civilization of South Asia (inter-departmental)
Languages in South Asia (Modern Language)
South Asian Political Systems (Political Science)
International Politics of South Asia (Political Science)
Seminar: South Asian Politics (Political Science)
History of South Asia I & II (History)
Nationalist Leaders of South Asia (History).

The above list is in addition to the many scientific and technical courses which are applicable to the specialized interests of the 211(d) grant program.

Special conferences and seminars and occasional non-degree short courses add to the instructional resources of the program. These involve participation of foreign students, scholars and government officials.

Some fellowships and assistantships are available to foreign students. Those who are awarded assistantships have the non-resident fees waived and pay \$14 per semester hour when enrolled in seven or more semester

hours of work, plus campus privilege fees. Orientation, guidance and academic counselling, as well as training in written and spoken English are available as needed.

Research Resources In the past, opportunities for overseas graduate and faculty research have been limited because state grant funds cannot be utilized for this activity, but the 211(d) grant opened up this prospect for graduate students in the Department of Grain Science and Industry. Overseas faculty research, except for that which is related to technical assistance projects, is normally accomplished through a sabbatical leave. A graduate research in India involved investigations of the baking quality of numerous varieties of Indian wheats for white bread, and of the application of organophosphate insecticides (fumigants) commonly used for grain storage to assess what residues are carried into foods locally prepared from these grains.

Collaborative arrangements with LDC institutions for research in the areas of grain storage, marketing, processing and utilization are encouraged and welcomed.

Special research capabilities and interests of the Department of Grain Science and Industry include:

1. Improved grain storage methods in developing countries.
2. Nutritional enrichment of cereal-based foods, both traditional and novel, for protein-deficient areas.
3. Improvement of marketing channels and capabilities.
4. Improvement or discovery of new methods of milling and processing grain, including oil seeds and pulses, into food and feed products.

Modern research facilities in the subject area, not generally available in other institutions, include a pilot bakery, feed mill, and pilot flour mill. Associated laboratories permit the study of physical, chemical and biochemical properties of cereals, oilseeds, pulses, and related products.

Information Resources The faculty of the Department of Grain Science alone is responsible for 455 publications during the past ten years. These deal with various aspects of grain utilization, processing, storage and cereal chemistry. A listing of publications may be obtained from the Department and reprints of many items are available.

The University Library at Kansas State is rich in resources on worldwide cereals development, and also assists scholars in tapping library resources from outside the campus.

Consulting services During recent years, faculty members of the Department of Grain Science and Industry have been called for consultation to Brazil, Colombia, Ecuador, Costa Rica, Guatemala, Honduras, Korea, Morocco, and several areas in West Africa under the provisions of the AID contract to assist with problems of grain storage and marketing. Other countries

recently included in the AID contract to assist with the problems of grain storage and marketing include Thailand, Indonesia, Nepal and the Philippines. These have been visited within the past 12-18 months.

Also under an AID contract, the Department has conducted extensive research concerning nutritional improvement of cereal-based foods, including consulting trips to Morocco and Pakistan.

Specialized subject areas in which professional staff of the Department have been active in consultation with AID, international agencies, and food firms include not only grain utilization, storage and marketing, but also grain processing (including oil seeds and pulses), and nutritional improvement of cereal-based foods.

Eleven professional staff members of the Department are available for contractual consultation by special arrangement with the university in these and allied fields, both as individuals and in team consultation.

BREEDING OF AGRONOMIC CROPS UNIVERSITY OF MISSOURI

Grant Program Director: Dr. J. M. Poehlman
Department of Agronomy
University of Missouri
Columbia, Missouri 65201

Grant was terminated June 1973.

Departments Involved: Department of Agronomy, College of Agriculture; Office of International Agricultural Programs; International Study Center.

Indian Counterparts: Orissa University of Agriculture and Technology at Bhubaneswar; APP programs in Orissa and Bihar.

Current Counterparts: Asian Vegetable Research and Development Center, Taiwan; International Rice Research Institute, Los Banos, Philippines; Northeast Agricultural Center, Thailand.

The Department of Agronomy at the University of Missouri has a distinguished record in crop breeding and genetics, and the University has maintained a steady interest in agricultural programs in India since 1952. Moreover, under an AID participant training contract, the institution has provided some 200 man-years of academic instruction to Indian students at Missouri. The 211(d) grant is designed to capitalize on this fund of relationships and practical experience.

The specific interests of the Agronomy Department is concentrated in the study of corn and wheat genetics, but its overall

program is supported by the Department of Plant Pathology, Entomology, Agricultural Chemistry, and Statistics, as well as by the Division of Biological Sciences. An additional asset is the Agricultural Experiment Station's Chemical Laboratories which are well equipped for analyses of plant materials. A University Computer Center provides facilities for research data analysis. Cooperation between the Department of Agronomy and the U.S. Department of Agriculture on crop breeding research is a model of long standing. As with other CUSURDI grants, this one has developed its program around the employment of a professional project leader who carried out a wide range of consulting activities as well as coordination of instruction and research bearing on the subject area. The Department staff includes more than fifty full-time persons with academic rank, and at least a half dozen of them have had extensive experience in India.

Instructional Resources Expanding the international dimensions of the Department's instructional program has taken place at both graduate and undergraduate levels by course revisions, new courses, and staff strengthening, as well as by foreign participants in the graduate program.

Courses in crop breeding, genetics, cytogenetics, population genetics, crop production, crop physiology, seed testing, and soil fertility are taught at both undergraduate and graduate levels. Two courses most recently developed are:

- (a) International Agronomy: an introduction to the differences between tropical and temperate agronomy and the agronomic problems of developing countries;
- (b) Philosophy of Extension: especially designed for foreign students in agronomy to emphasize the linkages between the various facets of agricultural development.

The Department sponsors both post-doctoral appointments (visiting professors and

lecturers) and graduate assistantships for foreign nations. A few graduate assistantships are also available to U.S. nationals to provide them with opportunity to conduct thesis research.

Occupational professional seminars are conducted on campus to add to the instructional resources of the program. These are generally conducted on campus to add to the instructional resources of the program. These are generally conducted by experts brought to the campus from crop breeding programs in developing countries.

Research Resources Cooperative research on pulses was initiated through this project with the Orissa University of Agriculture and Technology, Bhubaneswar, India, through graduate student research projects. This research has led to the development of a worldwide network for improvement of the mungbean, a major pulse crop in parts of India and in several countries in Southeast Asia. Research was carried forward both in India and Missouri on the evaluation of the genetic variability in the mungbean species. Several hundred strains have been added to the USDA germ plasma collection, an international nursery to learn about adaptation of the species in general and specific genotypes in particular has been established, and basic studies on photoperiodism, plant type sources of disease resistance have been carried forward. This research could have important economic and dietary consequence in those countries where mungbeans serve as an important part of the diet of the native people. Utilization of the mungbean as the research vehicle for this project has improved the University of Missouri, Department of Agronomy, research capabilities in two important ways:

1. It has permitted UMC agronomists to establish working research relations with agronomists in many tropical and subtropical countries. In 1973 the International Mungbean Nursery was grown at 23 locations in 14 countries. These research experiences have increased

Departmental expertise to assist with foreign agricultural development.

2. It has broadened the scope and perspective of UMC Agronomy graduate students attached to the project. Plant breeding taught using wheat or the soybean as examples results in students thinking in terms of Missouri or U.S. Agriculture. By using the mungbean as the subject of their thesis research they think in terms of agriculture on a world-wide basis.

Information Resources An extensive library of materials on plant breeding, tropical agriculture, world food production, and related subjects has been developed as a result of the University's overseas activities. Normal interlibrary loans

with cooperating institutions are available for sharing these materials.

Several recent publications resulting from the mungbean research may be obtained from the Department, and two of them have been distributed already to AID agricultural officers.

Consulting Services Additional collaborative arrangements with LDC institutions for research on plant breeding, particularly mungbeans, are welcomed by the University, and staff members of the Department of Agronomy are available for consultation on a limited basis.

Consulting capabilities of the staff include plant breeding, genetics, crop physiology, seed production, grain and forage production, soil fertility and testing, and soil chemistry and physics.

SOIL-PLANT-WATER RELATIONSHIPS OHIO STATE UNIVERSITY

Grant Program Director: Dr. Trevor G. Arscott
Agronomy Department
Ohio State University
Columbus, Ohio 43210

NOTE: The grant was extended to June 1975.

Departments Involved: Department of Agronomy, College of Agriculture and Home Economics.

Indian Counterparts: Punjab Agricultural University at Ludhiana and the University of Udaipur.

The focus of the 211(d) grant program at the Ohio State University is on soil-water-plant relationships. The applied component of this work is primarily concerned with crop and land management systems for food and fiber production and for general improvement of the environment.

During the last two decades, faculty of the College of Agriculture have been instrumental in graduate education of some fifty scholars

from Asia, Africa and South America. Faculty members have devoted some fifteen man-years in foreign countries during the same period. The School has assisted in university development programs in India and Brazil, and staff have carried out consulting assignments in several countries of Africa and Central and South America.

Under the auspices of the grant program, working relationships were developed with faculty at the Punjab Agricultural University and with the Indian Salinity Research Institute.

An important component of the 211(d) grant at Ohio State is the broadening of the interests and involvement of faculty and students to encompass the full international dimensions of their disciplines. Like other

CUSURDI programs, the appointment of an international professor provides the catalytic agent for developing the grant program and for coordination with other institutions in the CUSURDI group.

Instructional Resources A number of advanced courses in the Department of Agronomy reflect the emphasis directed toward injecting an international component of soil-water-plant relationships into existing courses in crops and soils.

Specific international courses include Crop Production in Developing Countries and Tropical and Subtropical Soils, both available for upperclass and graduate credit. Specialized courses on Sugarcane Physiology and Nutrition, Banana Production, and Agroclimatology are also available.

Resident and foreign faculty members (and graduate students) with experience in international agriculture give talks at weekly departmental seminars, about fifteen percent of which are based on international aspects of soil-water-plant relationships. Somewhat similar seminars are presented by the Departments of Horticulture and Agricultural Engineering. Special lectures are also presented several times a year by U.S. and foreign scholars and scientists with experience in the soil-water-plant subject area.

Occasionally international seminars, involving noted scientists from less developed countries, are presented.

About 25 graduate research fellowships are available annually for studies in soil-water-plant relationships. The majority of these are in the Departments of Agricultural Engineering and Horticulture. Additional graduate students are supported by AID contracts.

Research Resources Grant funds permit several U.S. graduate students concentrating in soil-water-plant studies to undertake graduate research.

Recent graduate research subjects include such topics as zinc characterization and availability, potassium release and fixation, phosphorus extraction from soils and result-

ing yield responses, and other soil mineralogical investigations.

Faculty research in India and Brazil usually involved two or three faculty members per year, and several undertook research-consultation assignments in Africa and Central America. In general, Department research has centered on production problems of tropical soils, and on water management, soil fertility evaluation, and the interrelationships among soils, water, and plants.

International graduate students are encouraged to do their research thesis on soils collected from their own countries or with crops adapted to their native lands. Previous to starting their research, working arrangements are made with scientists in their home country. Students from arid countries are encouraged to obtain research and other educational experience at other U.S. institutions specializing in soil salinity and alkalinity studies, and such arrangements have been made with the Universities of Arizona and California and with the U.S. Salinity Laboratory, where graduates may spend several months.

Laboratory resources for agronomic research at the University include all the standard facilities and many specialized ones. The latter include a spectrograph for simultaneous analysis of 17 elements in plant tissues, a flame photometer, an amino acid analyzer, chromatographic equipment for analysis of pesticides and other contaminants of low concentration, beta gauging equipment for measuring leaf water content, X-ray diffraction for soil mineral identification, an optical microscope for the same purpose, a 400-channel analyzer for radioactive studies, and eight plant growth chambers.

Information Resources The University is an active participant in the Inter-Library Loan Service, and requests for acquisitions are handled directly by the University Library which has computerized service for storage, retrieval, microfilm service, etc.

Special research publications on India and Brazil are filed in the Agronomy Library and

are catalogued for the use of staff members and students.

Some of the theses relating to soil mineralogy in the subject area of the grant program are published and may be obtained through the university grant officer. A research paper on "People, Crops, and Food" has been issued by the Ohio Agricultural Research and Development Center.

Consulting Services Current and recent consulting activities in the subject area of the grant have included the following topics:

Tropical soils research planning (National Academy of Science)
Soil and crop research needs in Indonesia (Ford Foundation)
Soil and crop research needs in Uganda (AID)
Rubber production in Africa (Goodyear)
Banana production (AID)
Aquatic weed control in India (AID)

Fertilizer needs in less developed countries (International Chemicals)
Soil and water management in India and Brazil (AID)

Team consultation can be arranged through the Dean of the College of Agriculture. Special geographic interests of staff include Central America, Brazil, India, Africa (Congo and Uganda), and special interest is evidenced in inter-institutional collaboration, both U.S. and foreign.

At least nine senior professional personnel in Soil and Crop Sciences are active in or available for consulting service. Their specialties include the following subjects:

Soil fertility
Research administration
Soil Chemistry and radioactivity
Soil genesis and classification
Forage physiology
Weed control
Soil physics and hydrology.

CROP PRODUCTION PENNSYLVANIA STATE UNIVERSITY

Grant Program Director: Dr. Richard H. Cole
Department of Agronomy
Pennsylvania State University
University Park, Pennsylvania 16802

The grant was terminated December 1973.

Departments Involved: Department of Agronomy.

Indian Counterparts: Mahatma Phule Agricultural University at Poona; and Rahuri.

The initial focus of the Penn State grant program was in the area of crop and seed production, with particular reference to the dry-farming conditions typical of the state of Maharashtra in India. The grant program's overall objectives, however, were of a broad character and designed to strengthen the institution's competency and interest in applying its resources to the agronomic

problems of comparable areas in various parts of the world. The program was primarily implemented through a Professor of International Crop and Seed Production who served as the grant officer.

Principal attention was given to the area of forage crop improvement and production, and soil characterization in less developed countries. Other areas of interest included forage breeding; crop physiology and soil fertility; ecology, production, management, quality control and related factors of the crop sciences; land use management; and agricultural education programs.

One facet of the program at Penn State was the organization of closer informal relationships between graduate students, both U.S. and Indian, and faculty concerned with the objectives of the program. An evening family program, arranged for by the students and Indian participants, was held monthly to orient all concerned with family life abroad, with international travel, and with program commitment. Special efforts were also made by faculty to strengthen graduate student advisory resources. A so-called Rural Transformation Program, to encourage interdisciplinary study and research in agricultural development abroad, is maintained by the College of Agriculture.

Instructional Resources In addition to the standard technical courses offered by the Department of Agronomy, a plant science course for undergraduates introduces students to world crops production, and a special tropical crops course is available at both undergraduate and graduate levels, as is a course in tropical soils. A weekly International Agronomy Seminar encourages participation of both faculty and graduate students.

Courses in related areas that provide depth to the instructional program in international agriculture include the following examples: International Agricultural Trade and Development (Agricultural Economics), Rural Social Change (Rural Sociology), and Educational Programs for Developing Countries (Agricultural Education).

Non-degree, specialized, individual training for international workers in agriculture is offered on requests.

Graduate assistantships are available to properly qualified students of agronomy who express a career commitment to work in international agricultural development. Foreign scholars may receive financial support through the regular AID participant programs. Tuition paid by foreign students is the same as for any other non-resident of the state. All foreign students must establish that they have employment in their home nation upon completion of their studies.

Research Resources Relationships with the Mahatma Phule Agricultural University, particularly its constituent Poona College where student assignments were developed, encouraged mutual exchange of thesis problems and research topics. Cooperative research interests centered principally on grain and forage crop production. Special attention was given to production and crop management of sorghum and soybeans, crops of important potential value to India.

Within this framework, the major factors studied were planting patterns (including seedling emergence and vigor), the effects of maturity on crop quality (including the development of a crop efficiency index), and intercropping (plant geometry). In addition, graduate thesis research included phosphorus fixation as it effects sorghum nutrition, determining the international use of a new procedure for soil analysis, plant population genetics, and relationships between crop production and soils and climates.

The Department of Agronomy welcomes additional collaborative arrangements with other LDC institutions in temperate areas where cool seasons forage crops contribute significantly to the nation's economy, and in all areas where assistance in soil characterization is an important step in understanding production potentials of the land.

The University maintains a well equipped and established soil characterization laboratory for international instruction and research. The soil characterization personnel are involved in remote sensing research and with the availability of earth resource satellite imagery will be interested in its international applications to evaluate soil resources. The institution's leadership in forage crop improvement and production is supplemented by the U.S. Regional Pasture Laboratory located on campus. Service laboratories are available in soil testing, forage analysis, and plant analysis.

Information Resources No special information-sharing program relating to the specific interest of the

grant-supporting program has emerged, but the resources of the University's extensive agricultural library are available through standard inter-library loan arrangements with other institutions. Special requests for information are also processed. Copies of all reports from the University's international projects are distributed to AID.

Publication of faculty research studies in international programs is in the form of reports to funding institutions, but consideration is being given to the development of a more extensive program of research publication.

Consulting Services Faculty of the Department of Agronomy with consulting capabilities in the subject area include a number of senior staff with experience in India, Argentina and the Bahamas. In the area of crop and soil sciences, the Department's consultation interests are principally in (a) forage crop improvement and production

research, (b) soil characterization research, and (c) agriculture and university development. Professional staff have been utilized in overseas consulting in plant breeding and genetics, crop production and management, seed production, soil characterization and land use, soil and water management, plant protection, and agricultural education.

Professional personnel available for contractual consultation include specialists in crop improvement, production and management, weed control, agricultural education, soil characterization, soil fertility and analysis, corn breeding, seed production, crop quality and utilization, and alfalfa breeding.

Team consultation can be arranged. Although major geographic interests are in India and Latin America, consideration will be given to other developing areas also, but the staff is most qualified to provide assistance to areas that utilize temperate species and have soils similar to those found in the humid Northeast.

AGRICULTURAL ECONOMICS UNIVERSITY OF TENNESSEE

Grant Program Director: Dr. David W. Brown
Department of Agricultural Economics and
Rural Sociology
University of Tennessee
Knoxville, Tennessee 37901

Note: The grant was terminated December 1973.

Departments Involved: Department of Agricultural Economics and Rural Sociology, in Agricultural Economics and Rural Sociology, in cooperation with other departments and the Institute of Agriculture.

Indian Counterparts: Mysore University of Agricultural Sciences at Bangalore; APP programs in Mysore and Tamil Nadu.

The 211(d) grant at the University of Tennessee supported the agricultural economics component of the overall CUSURDI program. It focused on developing

capabilities for tackling the economic and social problems of disadvantaged farmers.

Particular attention to date was given to needs of South India where the University had an AID contract team for 15 years to work on agricultural modernization and rural development problems. The resulting curricula offerings, training materials, and analytical insights have relevance for other developing nations as well. Subject matter emphasis was more on programs at local and regional levels than on broad policy issues.

Recent research related to South India concentrated on improvement of grain marketing

systems, efficient use of irrigation water, planning of small farmer development programs, cultural and institutional considerations in farm mechanization, informational feedback about program effects, loan repayment problems of small farmers, and systematic planning of research-extension efforts.

The major overseas work of the Institute of Agriculture was in Mysore and Tamil Nadu States of India. However, a number of faculty in agriculture and forestry, as well as in behavioral fields, have experience and interest in agricultural and rural development in other countries as well. A sizable group of American graduate students with prior overseas experience (mainly Peace Corps) have interest in thesis work and/or jobs related to international development. The Department and the University, while not necessarily seeking large-scale overseas activities, are interested in fostering opportunities for faculty and students to provide useful international services overseas advisory work, research collaboration, short-team assignments, participation in special training programs, etc.--especially those which link to campus teaching, research, and extension activities.

Location in East Tennessee enables students to learn about a number of unique activities--the various TVA endeavors, atomic energy work at nearby Oak Ridge, environmental quality, manpower training, and several pilot programs related to disadvantaged rural people. Financial support for non-U.S. students is generally not available. However, the Department and other units of the University are very interested in having sponsored students from various parts of the world. Special effort is made to tailor their study programs to individual needs and interests, as well as to encourage learning and interaction beyond the classroom.

Instructional Resources Beyond the usual B.S., M.S. and Ph.D. specializations within Agricultural Economics, the Department provides a graduate level concentration in the Economics of Agricultural Development. Although no major in Rural

Sociology is currently offered, graduate students can take work in this discipline as a minor and as an emphasis in thesis research. At the M.S. level both thesis and non-thesis options are available.

For students who want some work in agricultural economics and rural sociology but would like a more flexible or action-oriented program, there is also an M.S. degree in General Agriculture. This is administered directly by the Dean of Agriculture, and a cross-departmental advisory committee is selected for each student. Courses beyond agriculture *per se* can be included. This program is useful for students who expect to have educational or administrative responsibilities related to a fairly broad spectrum of agricultural and rural development problems. It is not so appropriate for those who plan to become specialized researchers or to continue toward the Ph.D. degree.

The Department welcomes students who are majoring in other fields and who would like to take supporting work in agricultural economics and rural sociology related to development problems. The Public Administration Master's program has been revised to enable interested students to emphasize applications to agriculture and development.

Regular course offerings and other learning activities can be arranged for students who want to stay for only a term or two, rather than undertaking a full degree program. The Department and the University can also organize special noncredit training packages at the request of sponsoring agencies.

Advanced courses of special relevance to international agricultural and rural development include:

World Agriculture and Trade
Agricultural and Rural Program Planning
The Economics of Agricultural Development
Agricultural and Rural Transformation Problems.

A number of other advanced courses in the Department and elsewhere on campus are of more than usual interest to students with

agricultural and rural development concerns because of subject matter content and/or emphasis placed by the instructors on LDC applications. Some of these are:

- Land Economics (Ag. Econ.)
- Seminar on Adjustments to Industrialization (Ad. Econ.)
- Diffusion of Agricultural Technology (Rur. Soc.)
- Seminar in Rural Sociology (Rur. Soc.)
- Seminar in Extension Planning and Teaching Methods (Ag. Ext.)
- Grain and Oil Crops (Agron.)
- Soil Productivity and Management (Agron.)
- Program Planning in Adult Education (Cont. & Higher Educ.)
- Seminar in International Trade (Econ.)
- Seminar in Economic Development (Econ.)
- Economic Systems (Econ.)
- Location and Regional Development Theory (Econ.)
- Advanced Seminars in Economic Development (Econ.)
- Theory and Practice of Economic Planning (Econ.)
- Introduction to Public Administration (Pol. Sci.)
- Comparative and Development Administration (Pol. Sci.)
- Seminar in the Politics of Development (Pol. Sci.)
- Administrative Problems of Regional Authorities (Pol. Sci.)
- Social Interaction: Structure and Process (Soc. Work).

There have also been course and faculty additions in African, Asian, and Latin American studies. A campus-wide seminar series related to developmental change is planned to enable faculty and students in various technical and behavioral fields to interact more closely.

Educational and social activities beyond the formal classroom for students with international interests have been greatly strengthened, and a congenial spirit has emerged that apparently is a highlight for students who come to the University. New foreign students

are given the opportunity to participate in a comprehensive and enjoyable orientation program, as well as to interact with a host family. No housing facilities are specifically earmarked for international students, but an International House and several related organizations provide popular outlets for social interaction and special learning opportunities.

A number of professional level forums related to international development and world affairs are held on campus each year. In the Institute of Agriculture, a World Food and Fiber Problems series, as well as special seminars, provide vehicles for faculty and students to interact at a professional level with one another and with visiting scholars and experts.

Graduate application forms should be requested from and sent to The Graduate School, University of Tennessee, Knoxville, Tennessee 37916. A \$10 application fee is charged. It is helpful if the Department Head concerned can be informed about a pending application and the special interests of the student, so that he can ensure timely response and individualized attention to the proposed program of that student. The Division of International Student Affairs and the Division of International Education are also ready to help interested students or their sponsors. No departments in the College of Agriculture, except Agricultural Education, currently require the Graduate Record Examination. Non-U.S. applicants need to show evidence of reasonable proficiency in English.

Being on a quarter basis (with the Summer divided into two short sessions) there is considerable flexibility for students to begin work at times other than September.

Most foreign students in agriculture are sponsored by AID, foundations, or other international agencies. For qualified U.S. graduate students there are sources of financial support to work on Tennessee problems akin to those encountered in LDCs.

Research Resources Reflecting the Tennessee setting, staff and graduate research attention is focused especially on (a) production and marketing

adjustments associated with modernization of disadvantaged farmers; (b) resource development, human adjustments, and improvement of government services in low-income rural areas; and (c) design and evaluation of programs related to these problems.

Other international studies by faculty and students in the Department have included a survey of land tenure situations in the Dominican Republic, an appraisal of feasible cropping systems for a proposed atomic-powered agro-industrial complex in the Near East, and analysis of possibilities for self-sustained development of Malaysian land settlement projects, and a review of agricultural cooperative development in Iraq.

Additional studies deal with local level small farmer loan repayment problems, with a systems approach for planning research-extension thrusts in dry land areas, informational feedback problems of agricultural change-agencies, and cultural-institutional considerations in efforts to mechanize small farms. Teaching materials on "grass-roots" program decision-making are also being developed; this work will carry strong interfaces with such fields as rural sociology and development administration.

A number of Tennessee problems receiving research attention are similar to those encountered in LDCs. Some current analyses bear on: TVA impacts on rural counties, factors associated with rural family migration and mobility, delineation of functional economic areas; measurement of socio-economic status, community ties and leadership patterns among disadvantaged rural people, financing and improving rural living services, projections of future changes in agriculture, feasibility of small industries in outlying rural areas, adjustment possibilities for small farmers, and evaluation of pilot farm management extension programs.

Information Resources The agricultural branch of the University Library maintains a special collection related to Indian agriculture and development, with focus on the states of Mysore and Tamil Nadu. It includes a number of technical reports not available through normal publication channels. Inquiries should be addressed to the Agricultural Librarian, 224 Morgan Hall at the University, to the 211(d) grant officer, or by writing the Director of International Agricultural Programs, 111 Morgan Hall, University of Tennessee.

The Division of International Education at the University issues a quarterly publication, *Focus International*, which reports current University activities overseas.

Consulting Services Although the Department's major overseas involvement has been in India, its personnel have competencies and interest in application to other developing countries as well. Its graduate student roster includes nationals from other Asian countries, and from Africa and Latin America, as well as from India and the United States, and staff overseas experience has extended to other countries besides India. The specialized interests of staff available for contractual consultation are reflected in the sub-section on "Research Resources".

In agricultural economics and related fields there are a number of mature U.S. graduate students with LDC experience and language skills who have career interest in international development. Their graduate programs have included not only specialized concentration but also supporting work in such areas as development economics, rural sociology, and development administration. These represent useful resources to tap for job vacancies as well as for special analytical and service needs that might be linked to their thesis research.

Water Resources

Three universities--Arizona, Colorado State, and Utah State, in collaboration with California at Davis--are members of an inter-institutional consortium to increase their competencies in applying water management principles and techniques to food production needs in arid and sub-humid areas of the underdeveloped world. The consortium goes under the title of Council of U.S. Universities for Soil and Water Development in Arid and Sub-Humid Areas (CUSUSWASH). The 211(d) grants have had a multiplier effect (a) in stimulating the commitment of other resources to the program, (b) in increasing efficiency through pooling multi-university resources, and (c) in capturing the interest of faculty, students and constituents in the extension of technical services to other parts of the world.

The joint program emphasizes water management for agriculture and water use optimization, drainage, irrigation structures and practices, hydrologic systems analysis, as well as related social, economic and institutional factors governing technological introduction and use. The cooperating universities are applying their own experience with problems in our own arid West to selected areas overseas. Each emphasizes its own special area of competency in coordination with the others.

One other university program which concentrates on problems in arid lands has been developed outside the consortium activities. The University of California, Riverside, is concerned with dryland farming including such interests as the development of knowledge of plants of importance to agriculture in semi-arid tropical climates, subtropical horticulture and semi-arid land crop production.

University	Field of Technical Concentration	Geographic Concentration
Arizona	Watershed management with emphasis on systems analysis of water-related problems.	Latin America Middle East, Philippines, Africa
Colorado State	Water delivery and removal systems and related institutional development.	Thailand, Pakistan, Latin America
Utah State	On-farm water management for increasing food production.	Middle East, Latin America
University of California, Riverside	Dry-land moisture conservation, utilization, and farming problems.	

The CUSUSWASH institutions, utilizing inter-university committees, have developed a joint publications policy, and are studying means for improving inter-library services. A central secretariat has been established.

In addition to operating the State Agricultural Experiment Stations, the three universities operate State Water Resources Institutes under the Water Resources Research Act. They are also involved in both the desert and grasslands "biome program" of the International Biological Program which, in developing its basic productivity models, will collect and systematize data by hydrology, soils, plant-water relationships, and climatic information.

The activities of these four universities gives long-overdue recognition to the critical importance of water resource management for agriculture and for management of natural resources in many parts of the developing world where water shortages, seasonal superfluity and flooding, lack of water management technology and institutions and other water-related problems seriously impede progress.

These projects are managed in AID/Washington by the Office of Agriculture, Technical Assistance Bureau.

WATERSHED MANAGEMENT UNIVERSITY OF ARIZONA

Grant Program Officer: Dr. David B. Thorud
Department of Watershed and Management
University of Arizona
Tucson, Arizona 85721

Departments Involved Department of Watershed Management with cooperation from other departments in the Colleges of Agriculture, Earth Sciences and Engineering; Water Resources Research Center; Office of Arid Land Studies

The University of Arizona's role in the CUSUSWASH program concerns mobilizing an institutional capability that will be responsive to the needs of developing countries in the management of land and water for the conservation and production of water and other renewable natural resources. This would include economic evaluation for the optimal use of land and water, analysis and characterization of hydrologic systems, land rehabilitation practices designed to maximize on-site storage of moisture and control of erosion and the use of simulation techniques for predicting the production of range and forest vegetation, water and sediment.

The grant program at Arizona has helped bring together a critical mass of scientists, engineers and students to attack problems facing many emerging nations, e.g., the need to increase food production and to stimulate economic development based on agriculture. Under leadership of the Department of Watershed management, linkages have been developed with other departments in the Colleges of Agriculture, Engineering and Earth Sciences in a multidisciplinary effort in the management of land and water resources. Interdepartmental collaboration between the Department of Watershed Management, Hydrology and Water Resources, and Systems and Industrial Engineering has resulted in projects concerned with the application of techniques to decision analysis in resource management. The development of a remote sensing laboratory has been the concern of a joint venture of the Departments of Watershed Management, Office of Arid Land Studies and Soils, Water, and Engineering.

Linkages with overseas institutions have been with Latin America countries, notably Brazil and Mexico, Iran, Turkey, and Philippines and several African countries. The interdisciplinary and innovative approach to land and water management problems has made the University of Arizona particularly attractive to foreign students.

Instructional Resources The University of Arizona is one of only a very few universities with a full range of degree programs in natural resources management. In the Department of Watershed Management, professional programs are offered in watershed hydrology, forest watershed management, range management, natural resource recreation, wildlife management and fisheries management. Several of the Department's graduate courses have been restructured so that the material is applicable to various types of arid land conditions around the world. In addition to standard courses, special study programs are available in techniques for synthesizing the hydrologic behavior of watershed catchments, hydrologic processes encountered in arid and semi-arid regions, land management practices and their effects on hydrologic relationships, application of hydrologic modeling and systems analysis for optimizing the management of watersheds, and other systems analysis courses.

Special seminars and short-courses add to the instructional facilities of the program. The Department of Watershed Management conducts an annual short course for Bureau of Land Management personnel on basic factors affecting water movement, storage, distribution, and losses, as well as data collection and analysis, and on water management in arid environments. A hydrology short-course is also periodically conducted for the U.S. Geological Survey. Seminars are often held on some aspect of resource management.

Several half-time graduate research assistantships are available to students in the subject areas of renewable natural resource management. The actual number varies from year to year depending on the availability of funds.

Tuition for foreign students taking at least twelve credits is \$620 a semester, including fees. The University maintains a Foreign Student Adviser who, among other activities, conducts an orientation program to assist the student in adjusting to campus and community life.

At least eight of the professional staff in the Department of Watershed Management are particularly concerned with the objectives of the 211(d) grant program. Their specialized interest includes systems analysis, forest and range management, water supply forecasting and conservation, hydrology, irrigation, water resources planning, range management, watershed rehabilitation, erosion and flood control, and watershed modeling.

Research Resources Research activities related to the 211(d) program at the University of Arizona have concentrated on the development and modification of (a) hydrologic models, (b) economic and decision-making models, and (c) the use of computer technology for watershed management instruction and analysis.

Limited opportunities for overseas graduate and faculty research work are available. Extensive field research, in cooperation with other western land-grant universities and with support from the U.S. Department of Agriculture, is conducted regionally in regard to soil-water plant relationships, on farm water management, watershed and range management, and the effect of climatic patterns on agriculture and forestry.

The Department of Watershed Management has installed a unique teaching-research facility which is a completely interfaced hydrologic data acquisition-analysis system. It includes a small computer, hardware and software for working with live-telemetered data and provisions for rapid recall of the data from a magnetic tape library. Data may thus be collected, processed and analyzed in any desired fashion almost immediately.

The following titles of recent research publications in watershed management produced by Arizona staff provides an indication of the range of research activity:

Desert strip farming: A way to make the desert green.

A stochastic snow model to evaluate reservoir operation.

Predicting the hydrologic effects of land modifications.

Optimum control of irrigation water application.

Evaluation of worth of additional data in water resources.

Bayesian decision theory applied to design in hydrology.

Efficiency of hydrologic data collection systems.

Collective utility: a system approach to water pricing policy.

A stochastic model of runoff-producing rainfall for summer-type storms.

The effect of storm variability on run-off from small semi-arid watersheds.

Prediction of convective storm run-off in semi-arid regions.

Evaluation of the effects of water yield management.

System analysis: a decision-making tool for arid land development.

Operations research study of water resources: methodology and problem in an urbanized environment.

Analysis of ephemeral flow in aridlands.

Experimental program for analysis and validation of watershed models.

A computer automated hydrologic data acquisition system.

A direct passive electrical analog model of a watershed.

Copies of the above may be obtained from the Department of Watershed Management.

Information Resources The University of Arizona library is continually expanding its acquisitions in the general area of agricultural and resource development. A specialized collection of reference material, bibliographies and abstracts, on resource management is being developed within the Department of Watershed Management. The previously mentioned computerized retrieval system is part of this activity. Special-

ized water related information is being collected and stored within the Department of Hydrology and Water Resources. The Office of Arid Land Studies issues bibliographical publications and acts as a clearing house for the exchange of world arid lands information.

Several specialized abstracts and bibliographies have been prepared and are available to qualified field personnel on special request to the department of Watershed Management. These include:

- (a) Abstracts pertaining to hydrologic and range phenomena in arid regions (categories include range management, climatology, rainfall, water quality, drought, surface run-off, soils, irrigation development, and salt accumulation)
- (b) Bibliography on "interception" (the first in a long chain of complex inter-related hydrologic processes which influence the routing of water through a watershed)
- (c) Current research in the United States applicable to systems analysis in watershed management (includes hydrologic models, land treatments, economics of water management planning and operational models, erosion and sedimentation)
- (d) Bibliography on currently available reference material on waterbased erosion from which reprints or photocopies can be obtained

Consulting Services Professional staff of the University have been active in overseas consultation in such specialized subject areas as surface water supply forecasting, ground water development, water resources planning, on-farm irrigation practices, drainage systems, water quality management and watershed and range management. Consulting assignments in these subject areas have included work in Mexico, Venezuela, Brazil, Nigeria, Sub-Sahara Countries of Africa, Pakistan, Turkey, Iran and the Philippines.

Contractual consultation arrangements may be channeled through the University's 211(d)

grant office in the Department of Watershed Management.

WATER DELIVERY & REMOVAL SYSTEMS COLORADO STATE UNIVERSITY

Grant Program Director: Dr. Maurice L. Albertson
Department of Civil Engineering
Colorado State University
Fort Collins, Colorado 80521

Departments Involved: Departments of Agricultural Engineering, Agronomy, Civil Engineering, Economics, Political Science, and Sociology.

One of the unique characteristics of this essentially engineering-oriented program in water management and development of water resources is its inclusion of social, economic and cultural factors along with technological considerations. From a technical point of view, the Colorado State program emphasizes the study of water delivery and removal systems in terms of maximizing food production capabilities. But in terms of social content, the program recognizes the concomitant need to analyze prevailing social systems as they affect water utilization, including the kinds of institutional changes necessary, the sources of resistance to change, and effective ways of dealing with social resistance.

In applying the program to the conditions of developing countries, Colorado State University has been actively involved in the development of the Asian Institute of Technology in Bangkok, Thailand. This institute now offers Masters and Ph.D. degrees in (a) Water Science and Engineering, (b) Environmental Engineering, (c) Geotechnical Engineering, (d) Structural Engineering and Mechanics, (e) Systems Engineering and Management, and (f) Transportation Engineering and Management.

In Pakistan, Colorado State University's research activities are integrated mainly with

three Pakistan institutions and government organizations. Research studies have been directed at the Punjab Agricultural Research Institute to problems of water quality and leaching with special emphasis on water salinity.

Cooperative activities with the West Pakistan Agricultural University (WPAU) through the Departments of Agricultural Engineering, Agronomy, and Sociology involve studies on tillage practices as they affect soil-water relations, on sprinkler irrigation, determination of crop water requirements, determination of optimum size of irrigation plots, and the effects of tractor tillage. Work in the Sociology Department is progressing on methods of collecting field data on rural life and farmer practices affecting water and soil utilization. The Pakistan Directorate of Agriculture has also established direct linkages with Colorado State University in regard to irrigation practices, use of crop residues, land leveling and preparation, as well as other research activities.

Instructional Resources Well over 100 faculty and more than 250 U.S. graduate students and 50 from foreign countries are involved in the water resource programs and studies in the various departments of the University. In that context new and revised courses with international dimensions have been added to the curriculum in the six departments cooperating in the water resources program.

Among such graduate-level courses the Department of Agricultural Engineering offers

instruction in Irrigation Structures, Operation and Management of Irrigation Systems, an interdisciplinary course in International Irrigation Management, as well as a summer course on Irrigation Practices Training for foreign engineers, and a graduate seminar for analysis of research projects in water management. The Department of Agronomy conducts seminars of international scope for both undergraduate and graduate students, and also sponsors a Ph.D. cooperative training program with the Ministry of Agriculture in Iran. Civil engineering research is largely oriented to the solution of problems relating to natural resources development and with problems related to water resources and their development. The major areas of research include hydraulics, hydrology, ground water, soil mechanics, structures, and water resources engineering. The Department provides international content to the graduate programs of Water Resources Engineering and Water Resource Systems. It also hosts a five to six week Mobile Water Resource Institute which includes extensive field trips.

The Department of Economics offers graduate-level courses in Economic Development, Institutions in Economic Development, Economic Geography of Underdeveloped Areas, Geography of Indigenous Agricultural Systems, and two courses on the Economic Development of Latin America. The Department of Political Science provides graduate-level instruction in Political Modernization and Nation-Building, Development Administration and Change, Development Planning and other aspects of public administration. The Department of Sociology and Anthropology offers courses and seminars in Comparative Family Institutions, Social and Cultural Factors in Technological Change, Literature of Development, Education and the Development of Nations, Institutional Order and Development Change, Industrialization and Urbanization in the Third World, and Methods of Evaluation Research.

All of the departments mentioned and others participate in the University's International Interdisciplinary Seminar on Water Resources Management, a program conducted

throughout the academic year and meeting for two hours each week. The Seminar includes a variety of interdisciplinary team papers, country-by-country presentations, and specialized studies by invited experts.

To facilitate advanced studies in water management, graduate assistantships and research funds are available to qualified scholars in several of the departments. Standard orientation and counselling services are provided for foreign students.

Research Resources Research capabilities of the University in the field of water resources management cover a broad spectrum. Programs are offered under a cooperative arrangement with the Colleges of Agricultural Sciences, Engineering, Forestry and Natural Resources, and Humanities and Social Sciences. Through this cooperative arrangement, graduate students in water resources management may select a variety of cross-departmental study topics: saline and sodic soils, soil physics; water resources planning, hydromechanics, water systems engineering, foundations of optimization; remote sensing of resources, watershed analysis, systems ecology; economics of water resources, economics of natural resources, social and cultural factors in technological change.

Facilities exist in several colleges for fundamental and applied research, in such areas as hydraulics of water control facilities, physical biological and chemical properties of water (water quality), and economics of water resources development. Graduate students conduct thesis research both on campus and in foreign countries. There is also an interdisciplinary faculty-student seminar on water resources management with eight or more participating departments, on identification of factors and their interrelationships in optimum utilization of water and related land resources.

Thus the interdisciplinary character of the water resources program at Colorado State encourages team research and an intermixture of disciplines. At the same time each of the

appropriate departments carries out its own specialized research activities.

Water research emphasis in the Department of Agricultural Engineering, for example, has been directed to "Combination Check-Drop-Energy Dissipators", and on irrigation structures for water delivery and removal. Related research in the Department of Civil Engineering includes work on optimal timing of irrigation water, rural-urban aspects of water resources development, and the application of systems analysis. Relevant research in the Economics Department includes evaluations and projections of river basin planning, the impact of irrigated agriculture on export earnings (Mexico), and studies of institutional factors in economic development. Similar research in the Political Science Departments includes work related to the Pakistan Water Management Research Projects, comparative institutions for water development, the comparative experience of U.S. Indian and white farmers using irrigation. The Sociology Department is developing a "center" for data collection and analysis of social and cultural factors relating to developmental change.

Information Resources A separately-housed Water Management Program Library is maintained by the University as an interdisciplinary activity. The constantly growing collection is divided into sixteen major subjects categories, and is particularly rich in Pakistan materials. An annual accession list is prepared and may be obtained from the library.

Two films have been issued as a part of the water resources program at the University. One is a 35-minute film for general audiences about land forming for irrigation, and other is a 15-minute training film on techniques of setting transits, levelling, and other elements of level-basin irrigation.

Hundreds of scientific papers, articles, and theses, relating directly or indirectly to water resources management, have been published by the six departments cooperating in an interdisciplinary Water Management Research Project in Pakistan.

In addition to the publication of annual technical reports of the water resources program and the sponsoring of various research reports and studies, the University, as part of the CUSUSWASH group, issues a series of Water Management Technical Reports in bound printed form. These are available at a cost of \$3 a piece from the Engineering Research Center at the University. Titles include the following.

- Bibliography with Annotations on Water Diversion, Conveyance, and Application for Irrigation and Drainage (1969)
- Organization of Water Management for Agricultural Production in West Pakistan (a Progress Report) (1970)
- Dye Dilution Method of Discharge Measurement (1971)
- Water Management in West Pakistan (1970)
- The Economics of Water Use, an Inquiry into the Economic Behavior of Farmers in West Pakistan (1971)
- Pakistan Government and Administration: A Comprehensive Bibliograph (1971)
- The Effect of Data Limitations on the Application of Systems Analysis to Water Resources Planning in Developing Countries (1971)
- The Problem of Under-Irrigation in West Pakistan: Research Studies and Needs (1971)
- Check-Drop-Energy Dissipator Structures in Irrigation Systems (1971)
- Maximum Water Delivery in Irrigation (1971)
- Flow in Sand-Bed Channels (1971)
- Effect of Settlement on Flume Ratings (1971)
- The Problem of Water Scheduling in West Pakistan: Research Studies and Needs (1971)
- Monastery Model of Development: Towards a Strategy of Large Scale Planned Change (1971)
- Width Constructions in Open Channels (1971)
- Cutthroat Flume Discharge Relations (1972)

Consulting Services Due to the interdisciplinary team approach to Colorado State University's water resources research activities, consulting services involve six or more disciplines with about 40 people actively participating. Some of the consulting services have been in Pakistan and have been processed through AID and the Mission. More recently, contacts have been made in Thailand, Afghanistan, Nigeria, Turkey, and the Philippines. Other consulting services have involved contacts in several countries of Latin America, Africa and Europe.

Some subject areas in which experienced short-term consulting services are available include the following.

- Water systems engineering
- Groundwater systems
- Water quality hydrology
- Water resources planning

- Hydraulics of open channels
- Operation and management of irrigation systems
- Irrigation, soils and crops
- Soil and water conservation
- Erosion and sedimentation problems
- Economics of water resources
- Economic analysis and water resource development
- Economics of natural resources
- Water law
- Public relations in natural resource management
- Public administration for water resources
- Administration of natural resources
- Public policy formation
- Social and cultural factors in technological change
- Remote sensing
- Institutional building in water resources management

ON-FARM WATER MANAGEMENT UTAH STATE UNIVERSITY

Grant Program Director Dr. H. B. Peterson
Department of Agricultural and Irrigation Engineering
Utah State University
Logan, Utah 84321

Departments Involved Departments of Agricultural and Irrigation Engineering, Soils and Biometeorology, Civil Engineering, Political Science, Economics, Sociology, and Crops Science; the Division of International Programs, and the Utah Water Research Laboratory.

For more than eighty years Utah State University has been graduating students with specialized training in water resources development. Because of the state's heavy dependence on irrigated agriculture, on-farm management receives special instructional and research emphasis within a multidisciplinary framework.

For more than 30 years the University has

provided technical and research assistance to both private and public water management institutions in the Middle East and Latin America. At one time or another, students from nearly every Latin American, North African, Near East, South and East Asian country have studied at Utah State. Recent emphasis on Latin America has led to intensive training in Spanish and Portugese provided for both faculty and graduate students with research interests in Latin American water resource development. Courses in the engineering components of water management are offered overseas in Spanish and Portugese. Since 1972, such courses have been offered on the campus for the benefit of the many Latin American students and for U.S. 211(d) students as well.

The university has a linkage with the Inter-American Center for the Integrated Development of Water and Land Resources (CIDIAT) for the member nations of the Organization of American States. It also maintains the noted Water Research Laboratory and the Associated River Irrigation Laboratory which was established in 1945.

The focus of the 211(d) grant-supported program at Utah State has been on-farm water resources development and management. The program emphasizes (a) irrigation science and practice, (b) drainage theory and practice, (c) simulation of irrigation, hydrological and water resources systems, (d) practical irrigation science research for on-farm application, (e) fertility and management of irrigated soils, (f) water quality related to agriculture, and (g) irrigation economics and the economic efficiency of water utilization practices.

Instructional Resources In addition to the full graduate-level curricula of standard courses in the various departments participating in the Utah State water management program, the international application of technical subjects receives particular attention. Foreign graduate students are aided by a special consultation course on research. Many technical courses have been revised to enlarge their applicability to conditions in less developed countries, and regular seminars emphasizing developmental problems are presented.

Courses in soil-water systems for non-agronomists, soil fertility, characteristics of irrigated soils, water chemistry, and irrigation science and engineering reflect this internationalizing tendency of technical instruction at the University.

A variety of special seminars and short courses are also offered. Departmental seminars are held each week with staff and graduate students participating. Inter-departmental seminars are also conducted, with invited experts, providing departmental interchange on inter-related research problems. An annual Irrigation Problems and Practices short course of eight weeks, sponsored by AID, is especially designed for foreign participants.

Short courses for credit are also presented on request in Latin America through the University's extension program. Special international seminars such as those on water resources planning, and on irrigation science and water management are occasionally hosted on campus. Special instruction and assistance is also provided in individual cases to a limited number of foreign engineers assigned to the University.

Fellowships for U.S. citizens at the M.S. and Ph.D. level are sponsored by the program through the cooperating departments. Foreign graduate students receive support through various research programs where they can serve as research assistants, but these aids are frequently reserved for students who have completed a year of course study. There are no fellowships or assistantships specifically for foreign students, although foreign students are eligible for many of them. Those who qualify may have the non-resident fee waived, thus reducing their fees to \$146 per quarter. The University has a Foreign Student Advisor for all students; departmental advisors are also assigned. Wives of foreign students are hosted in English by wives of Utah State staff on a voluntary basis. It is noteworthy that the Department of Agricultural and Irrigation Engineering has the capability to teach any of its courses in the Spanish language.

Research Resources Research capabilities and interests of the staffs of the departments involved in the on-farm management program at Utah State span virtually all aspects of irrigated agriculture. The specific research strengths may be indicated as follows:

- Irrigation engineering
- Salinity control
- Drainage
- Water application technology both sprinkler and surface irrigation
- Economics of irrigation

In addition to laboratories and experimental farms, special research facilities include an

experimental drainage farm, several computers, a series of remotely-controlled weather stations which yield cloud-seeding methodologies used both locally and by the Ecuadorian Government, an Irrigation Canal Lining Laboratory, and the large Utah Water Research Laboratory. Utah State has developed outstanding capability utilizing hybrid (digital X analogue) computers.

Information Resources The University's extensive library holdings relating to on-farm water management include a document section and a computerized bibliography with a "key word" rapid retrieval system. Library holdings are available through the standard inter-library loan system, and a brochure describing the on-farm water management collection is available on request.

The Department of Agricultural and Irrigation Engineering maintains a separate specialized library concerned with water rights and water law in Central and South American countries. It contains microfilm cards or microfiche for more than 30,000 pages of legal documents, and includes many volumes not otherwise accessible.

The Department of Economics prepared a "Bibliography of Economics and Agricultural Production and Irrigation in Latin America" which is available and widely used by scholars throughout the western hemisphere.

Leaflets concerning short courses and seminars are issued in both English and Spanish, as are Latin American research reports which may be obtained by writing the Department of Agricultural and Irrigation Engineering. The University also maintains facilities for technical translation and printing.

A series of slides, with narrative in English and Spanish, on sprinkler irrigation is used instructionally on campus and for consulting and educational purposes abroad. A limited number of duplicate copies are available.

Catalogs of publications of the Utah Water Research Laboratory and of the Agricultural Experiment Station are available on request. These include bulletins, project reports (including student theses), occasional papers,

papers presented at various symposia or conferences, and reprints of articles contributed by staff members to professional journals.

Consulting Services The majority of about 30 Utah State consultants have been associated with activities in Central and South America. However, some work has been done in Japan and countries of the Middle East, especially Iran. Various competencies in water resources management and allied subjects exist to work in most parts of the world.

Subject areas in the water management field in which short-term consulting services are available and encouraged include the following:

- Irrigation and drainage engineering
- Institution building and development
- Hydrologic systems and weather modification
- Water resources systems and optimization techniques
- Water Law
- Soil moisture physics
- Fertility and management of irrigated soils
- Environmental control of agricultural wastes
- Hydrological and mixed systems modeling
- Water resources planning

These specific areas are complemented by general university programs in agriculture, water resources, weather modification, and the social sciences.

All of the graduate students in the program conduct thesis research or a major portion of it in one of the Latin American countries, under the direction of a senior staff member. Such studies have been conducted in Ecuador, Colombia, and El Salvador. Relevant theses are also submitted to AID/Washington.

Research in on-farm management and irrigation includes work sponsored by the Utah Agricultural Experiment Station, the Environmental Protection Agency, the Agricultural Research Service, the Utah Water Research Laboratory, and particularly the University's

Water Management Research Contract with AID. Most of the work involved in the latter is conducted in Latin America where Utah State researchers on two-year assignments are in residence in five countries with senior staff providing short-term on-site support.

Utah State actively cooperates in the on-farm water management field with a number of research and operating institutions in Latin America. With some, formal written agreements guide the work plans of Utah State researchers:

- Automation and remote sensing
- Irrigated soils and crops
- Water law and institutions
- Agricultural engineering and drainage equipment
- Weed control and water pollution

- Public administration for water resources
- Agronomy and soil physics
- Irrigation development and consumptive use of water
- Water quality engineering
- Farm irrigation systems and sprinkler irrigation
- Water resource planning and development
- Plant nutrition for irrigated crops
- Hydrologic and mixed systems modeling.

The policy of the University encourages a high interest of staff in international program consultation, both individually and in team arrangements. Requests may be initially directed to the University grant officer for the 211(d) program, but they should provide for adequate lead time in order to plan the consultation service most effectively.

MOISTURE UTILIZATION IN ARID AND SEMI-ARID TROPICS UNIVERSITY OF CALIFORNIA, Riverside

Grant Program Director: Dr. Glen H. Cannel
University of California
Riverside, California 92502

Departments Involved: College of Biological and Agricultural Sciences, Department of Plant Sciences, Department of Soil Science and Agricultural Engineering, Agricultural Experiment Station at Riverside.

This new 211(d) grant will finance a program focused on developing the University of California at Riverside to become a center of competence in dry-land farming for arid and semi-arid tropical regions. The grant will strengthen capabilities to deal with dry-land moisture conservation, utilization, and farming problems in arid and semi-arid tropical regions of developing countries having summer rainfall.

The University of California, through its Citrus Research Center and Agricultural Experiment Station at Riverside has been continuously involved since 1907 in problems related to research and management of agriculture in arid or semi-arid lands. The

Agriculture Experiment Station has as one primary mission the development of knowledge of plants of importance to agriculture in semi-arid tropical climates. This mission related primarily to agricultural production in semi-arid Southern California but the AES has acquired an international reputation in subtropical horticulture and semi-arid land crop production that goes back to the early 1920's. Members of its research staff are involved in many international organizations relating to agriculture and have served, frequently as consultants in many foreign lands.

Instructional Resources: Academic divisions of the Riverside campus of the University of California include the College of Biological and Agricultural Sciences, College of Physical Sciences, College of Social Behavioral Sciences, College of Humanities, School of Education, Graduate School of Administration, the Graduate

Division, and the Division of Undergraduate studies. The University has a solid core of academic courses and currently offers degrees in sixty-six majors.

The staff of the Agricultural Experiment Station at Riverside consists of 189 academic researchers and 400 non-academic personnel and technicians, who are engaged in research related to crop production, soil-water problems, pest management, plant disease protection, pollution problems, and other research areas related to semi-arid ecosystems. One-hundred sixty members of the experiment station faculty and staff hold appointments in the College of Biological and Agricultural Sciences, where they are intimately associated with teaching undergraduate and graduate students.

A variety of multidisciplinary degree programs are offered both by the College of Biological and Agricultural Sciences and by other colleges in the campus. Among some of their programs are Environmental Sciences, Paleobiology, Psychobiology, Systems Ecology, American Studies, Pre-Forestry, Pre-Veterinary Medicine, Comparative Literature, Applied Science, Physical Science, Social Environmental Sciences, Human Development, Urban Studies, Black studies, Asian studies, and Mexican-American studies.

Educational capabilities in dry-land farming in the UCR campus will be strengthened in the following areas:

- a. Graduate studies. An educational team will be formed from members of the Department of Soil Sciences and Agricultural Engineering, Department of Plant Sciences, and other departments within the College of Biological and Agricultural Sciences. The team will be responsible for evaluating present courses and curricula to determine ways for improving graduate student education and to add an international dimension in dry-land farming. Key members of the team will visit selected institutions and discuss course and curricula development. Course modifications and new courses required for a comprehensive program in

principles and practices of moisture conservation and utilization will be developed. An attempt will be made to increase the number of students from LDCs in programs at UCR in the field of dry land farming.

- b. Outreach Training Programs. Subsequent to determining requirements of selected LDCs and UCR's capabilities in meeting their needs, short-term on-site training programs will be initiated for LDC personnel. Detailed information on the LDCs obtained through visits and other linkages will be used to determine regions in the LDCs that would benefit from such programs.
- c. Special Non-degree Programs. Individual and groups who offer potential for non-degree programs will be located through the extensive communication network which is established under the grant. Special problem-oriented training courses will be developed in cooperation with AID and other interested institutions. Such courses can train groups from arid or semi-arid LDCs in dry-land farming. Other non-degree programs will include faculty exchanges between LDCs and UCR, sabbatical leaves, and post-doctoral training opportunities.

Research Resources: Research capabilities and the knowledge base will be improved in the areas of soil moisture conservation and utilization. Practices that will receive emphasis with respect to soil moisture conservation are contour or erosion slope plantings, alternate strips of tilled row crops and solid plantings, stubble mulching, rough tillage, and various water harvesting techniques and cultivation practices; and with respect to efficient soil moisture utilization, planting densities and row spacing, intercropping, rotations, selection of appropriate varieties, and fertilization.

Review, analysis and other mechanisms for developing research capabilities will proceed through the cooperative efforts of program teams. Interdisciplinary teams will be developed for cooperative activities in different

areas. Individuals from the teams will develop reviews and analyses of state-of-the-art of specific areas using information from the Bibliographic Resource Subsystem, seminars and discussions with AID, invited experts and visits to LDCs and institutions in developed countries. Preliminary in-house papers will be developed that outline critical areas for adaptive and applied research. A conference will be organized between program staff and staff members at Oregon State University who have been involved in international programs concerning dry-land farming in winter rainfall areas. Potential overlaps and gaps will be determined and an effective division of labor will be arranged.

Program teams will submit activities proposals to the grant program Director who, with assistance of the Executive Committee, will approve appropriate proposals, which will include adaptive and applied research in LDCs, graduate student dissertation research in LDCs, visits to LDCs to acquire an understanding of the constraints imposed on soil and crop management systems by LDC conditions. Team training will be designed to improve capability to develop management practices that make efficient use of precipitation and result in consistent, adequate crop yields within reasonable limits of climate variation.

Informational Resources: Among the major service facilities on campus is the UCR General Library, which has branches in several of the colleges. The general Library has a collection of more than one million volumes in open stack arrangement. One of its specialized branches is the Bio-Agriculture Library, which contains an outstanding collection of more than 70,000 books related to agriculture, sub-tropical horticulture, and the biological sciences. It currently receives some 1,900 serial publications, and a computerized retrieval service facilitates literature searches in the sciences.

Also on campus is the Computing Center which is available for use by faculty and students in all departments for research and teaching.

The review and analyses of the current state-of-the-art will provide a comprehensive, cross disciplinary reference work for research and extension workers in dry-land farming covering soil moisture conservation and utilization practices, crop management, crop resources, crop utilization and other areas. The technical report will emphasize principles and practices used in summer rainfall, arid and semi-arid regions of the tropics. The report will be published and made available to linked institutions and other interested parties.

Finally, the Agriculture Experiment Station has numerous information linkages through current and past programs with international, federal and state agencies, including World Health Organization, the Agricultural Research Service, U.S. Forest Service, Bureau of Land Management, the State Water Resources Center, and many others. These contacts relate to a broad spectrum of soil-water-plant management research activities and can be drawn upon.

Consulting Services: This grant will enable UCR to develop competence among its core staff to respond to AID, other donor, and LDC requests for expert advice or assistance in dry-land farming for LDCs. The function of advisors may include: problem identification and analysis; program/project design; project operations including research; technical and advisory services; and evaluation.

Staff who will be involved in grant activity include staff and faculty of the Department of Soil Science and Agricultural Engineering, and the Department of Plant Sciences. Individual specialities will cover soil physics, soil chemistry, soil classification, weed control, agricultural engineering, dry-land moisture conservation, dry-land agronomy, agricultural economics, anthropology, extension farming methods and systems and others. This core will be supported by specialists brought in from other universities, of dry-land regions both from U.S. and abroad. These visiting specialists will conduct seminars, be a part of an exchange system in research and teaching.

Tropical Soils

Five U.S. universities receiving 211(d) grants are collaborating to strengthen a coordinated system of competencies in tropical soil science which can be of exceptional utility to many less developed countries. Within this University Consortium on Soils of the Tropics, each institution concentrates on one aspect of tropical soil science or relates its work to a specific ecological environment, so as to avoid overlapping and duplication. The defined fields of concentration are as follows:

University	Field of Technical Concentration	Geographic Concentration
Cornell University	Cultural systems for soils of the tropics	Latin America, Africa, Middle East
University of Hawaii	Biology and mineralogy of soils of the tropics	Asia, Pacific Basin
North Carolina State University	Soil fertility relating plant nutrition to the physical and chemical properties of tropical soils.	Latin America
Prairie View A&M College	Soil fertility problems under savanna-prairie ecology.	Africa
University of Puerto Rico	Conservation and protection of soils of the tropics	Latin America

The fields of concentration are, of course, interrelated. Each is designed to augment or complement existing competencies of the institution and the Consortium as a whole. Collectively, they provide a range of specialties representing the major facets of soil science for U.S. competence in soils of the humid tropics. Another consortium (CUSUSWASH, see section III) specializes in water management for soils of the arid and subhumid tropics.

The ecological and geographic interests represented by the five institutions of the tropical soils consortium range from the volcanic soil environment of Hawaii, the prairie soil conditions of Texas, and the highly weathered soils of North Carolina and Puerto Rico, to a wide range of cooperative research sites in Latin America.

To implement the joint program, the Consortium plan provides for (a) a council of institutional representatives having administrative authority for policy and program guidance; (b) an executive committee of institutional project leaders to develop and implement detailed plans; (c) additional resident and visiting professional staff to reinforce and complement existing competencies; and (d) support of graduate students and faculty for develop-

ment of competencies and resources, including personnel exchanges, assignments of personnel to tropical areas for experience, and joint cooperative activities for special services. The plan also calls for increasing institutional material resources and supporting staff, including library facilities, technicians and other supportive services.

These Tropical Soils Science grants are managed by AID's Office of Agriculture in the Technical Assistance Bureau.

CULTURAL SYSTEMS FOR SOILS OF THE TROPICS CORNELL UNIVERSITY

Grant Program Director: Dr. Matthew Drosdoff
Department of Agronomy
Cornell University
Ithaca, New York 14850

Departments Involved: Department of Agronomy; Office of International Agricultural Development.

The principal emphasis of the grant program at Cornell is on the study of cultural systems of tropical soils for crop production under various environmental conditions. The program focuses on (a) further development of graduate instruction in tropical soils, particularly for personnel committed to agricultural service to developing countries; (b) use of visiting professorships and scientists to strengthen teaching and research in soils of the tropics; (c) expanding library and other informational services and preparing pertinent training materials; (d) awarding graduate assistantships and related support for both U.S. and foreign students with a career commitment to tropical agriculture; and (e) involvement of permanent faculty in research and teaching in soils of the tropics.

At least ten members of the faculty in Soil Science have had direct work experience in tropical countries, and the service capabilities and experience of Cornell soil scientists are well known. The university's Office of International Agricultural Development centrally coordinates overseas activities and relationships with other agricultural programs.

Instructional Resources Forty-five courses in various aspects of

international agricultural development, enrolling more than four hundred students, are offered in the College of Agriculture. Of these the following relate specifically to soils, environments and production in the tropics:

Geography and Appraisal of Soils of the Tropics
Management Systems for Tropical Soils
Tropical Meteorology
Tropical Agriculture
Special Topics in Soil Science
Special Studies of Problems of Agriculture in the Tropics
Forages of the Tropics for Livestock Production.

In addition to these formal courses, seminars on tropical soils and crops are given periodically, and a tropical soils discussion group for faculty and students meets every week during the academic year. Visiting scientists are brought to the campus for periods of a week to six months as consultants and lecturers in the subject area. They bring specialized knowledge and experience not otherwise available, fresh perspectives, and new techniques of dealing with tropical soils problems.

Under terms of the 211(d) grant, about five assistantships per year are made available to qualified graduate students, both U.S. and foreign, who are ready to make a career commitment in this and allied fields of activity.

Most graduate assistants in tropical soils conduct their thesis research in a tropical environment. In some cases this takes place in collaboration with the Universities of Hawaii and Puerto Rico, but the Department also maintains linkages for graduate research with other overseas institutions. Graduate overseas research is under the guidance of senior faculty with special competence in the field of study and is carried out in collaboration with scientists of indigenous institutions on problems mutually acceptable to the major adviser and the host institution. Periodic field visits of Cornell faculty advisers also provide opportunities for consultation with host country scientists and research agencies.

Cornell also participates with other universities in intensive Tropical Soils Institutes.

These include such subjects as soil classification, geomorphology, soil physics, climatology, soil chemistry, mineralogy, and soil-plant-water relationships. The Institutes combine lectures with problem-solving and field studies. Inquiries from prospective graduate students and interested technical assistance agencies may be addressed to the Department of Agronomy.

Frequent special training programs for both groups and individuals, and intensive short courses, sponsored and financed by outside sources, are also part of the instructional scene at Cornell.

Research Resources Over many years of experimentation Cornell has assembled extensive research resources in the way of laboratories, field plots, greenhouses and other research facilities and equipment.

In an AID-financed research project Cornell cooperates with the University of Puerto Rico, the Ministry of Agriculture of Brazil and Soil Research Institute of Ghana in studying soil fertility problems of the humid tropics. Cornell has completed a major technical assistance program at the College of Agriculture of the University of the Philippines in which emphasis was directed to graduate research and training. The linkages established have been maintained.

The Agronomy Department staff maintains linkages with scientists and institutions in Colombia, Brazil, Venezuela, the Dominican Republic, Ghana, Nigeria, Peru, Mexico, Iran, and French-speaking institutions working in Africa, and can arrange with them for graduate student and staff research under appropriate circumstances. The tropical soils research program at Cornell is closely coordinated with a similar activity at North Carolina State University under an AID-research contract. Opportunities for graduate research overseas are expected to expand steadily.

Information Resources In addition to the extensive library resources at Cornell in the whole field of agricultural development, the Agronomy Department library is steadily expanding its acquisitions on tropical soils and related subjects. Lists of available publications in the collection may be obtained from the Director of International Agricultural Development.

In collaboration with other institutions of the Tropical Soils Consortium, techniques and resources for making tropical soils literature more widely available are being investigated. The goal is to establish a convenient retrieval and reproduction system. It is also envisioned that Cornell will undertake an inventory of the on-going work on tropical soils in a major section of the world.

Consulting Services Fourteen faculty members of the Department of Agronomy have experience related to tropical soil problems and conditions in the following subject matter areas: soil classification and morphology, soil chemistry, soil-plant-water relationships, tropical crops, soil microbiology, soil mineralogy, and particularly tropical soil cultural systems and methods of optimizing them.

Professional staff are permitted to consult two days per month or the equivalent in accumulated consulting time up to twenty-four days per year at full pay. In addition, professional staff may use up to twenty days per year of paid annual leave if they wish.

Leave without pay may be approved under appropriate circumstances.

Request for information about consulting

services and personnel available may be addressed to the head of the Department of Agronomy, Emerson Hall, Cornell University.

BIOLOGY AND MINERALOGY OF SOILS OF THE TROPICS UNIVERSITY OF HAWAII

Grant Program Director: Dr. W. G. Stanford
Department of Agronomy and Soil Science
University of Hawaii
Honolulu, Hawaii 96822

Department Involved: Department of Agronomy and Soil Science, College of Tropical Agriculture.

The University of Hawaii is one of the only two universities in the United States that has a College of Tropical Agriculture. Hawaii's geographic and soil characteristics, as well as its multi-racial culture and relationships with Asia, make the University a special component of the Consortium on Tropical Soils Sciences. It provides a wide variety of interdisciplinary studies of tropical environments, resources and problems. Moreover, many of its faculty are of Asian ancestry and its student body includes a large proportion of foreign students.

Teaching, research, and extension facilities are located at sites throughout the Islands, thus providing examples of many different kinds of field conditions. Similarities between Hawaiian soils and tropical and subtropical soils elsewhere have been demonstrated, and local soil research appears to be applicable to a rather wide sphere of developing countries.

The University maintains extensive relationships in the Pacific Basin and Asia. The East-West Center for Cultural and Technical Interchange, funded by Congress, supports international exchange and service programs and brings students to the University for advanced study. About fifty such students are normally working toward advanced degrees in some field of tropical agriculture. The Center also sponsors or hosts numerous conferences and short courses, some of which deal with rural development problems in the tropics.

The University of Hawaii's special area of concentration in the overall program of the Consortium is the field of biology and mineralogy of soils of the tropics.

Instructional Resources The program of the Agronomy and Soil Science Department has two special features: (a) it encourages the student of tropical soil science to include other related subject matter in his study program, such as tropical crop physiology, plant protection and breeding, geology and geophysics; and (b) its basic soils course, Introduction to Tropical Soils, uses audio-visual-tutorial methods extensively to supplement the conventional lecture and laboratory approach.

Both its undergraduate and graduate curriculum in soil science concentrates on tropical conditions. This is true of the standard soils science courses- Soil Fertility, Soil Physics, Causes and Control of Soil Erosion, Soil and Clay Mineralogy- as well as of the more specialized courses listed below:

Tropical Soil Survey and Interpretation
(field study)
Meteorology in Agriculture
Soil Formation and Classification
Principles of Tropical Agronomy
Tropical Crop Production
Sugar Cane Agronomy
Pineapple Culture
Pasture Management
Soil Microbiology
Plant Tissue Culture
Soils and Man (for non-soils majors).

Courses are also offered in Agricultural Engineering, Animal Science, Botany, Civil Engineering, Entomology, Geography, Geology and Geophysics, Horticulture, Plant Pathology, and Plant Physiology.

An intensive six-weeks summer course in Tropical Crop Production is conducted in the field on a very practical level. The course covers tropical root and tuber crops, rice and other grains, and tropical vegetable and fruit crops. Emphasis is given to soil problems, physiology, and pest control. Shorter specialized seminars, such as a recent one on Soil-Plant Systems, are also presented from time to time.

As a part of the Consortium, the University of Hawaii prepares and hosts consortium workshops when appropriate. An example is a workshop on teaching basic soils courses in order to consider innovative teaching methodologies and to provide field opportunities to learn more about tropical soils like those represented at the University's various field stations.

A variety of short courses, conferences and non-degree programs are developed on request. The College maintains a Branch Station, as well as a Rice Training Center, on the island of Kauai which is equipped for dormitory facilities for such occasions. The Rice Center also provides training for USAID agriculturists as well as Peace Corps personnel slated for overseas assignments in rice-growing areas.

In addition to the Rice Training Center, two private research organizations--the Hawaiian Sugar Planters Association Experiment Station and the Pineapple Research Institute--are located near the main campus and are utilized on a cooperative basis in both teaching and research.

Nearly a dozen graduate research assistantships are normally available to qualified students in tropical soil science. Information on these may be obtained from the Chairman of Graduate Programs in the Department of Agronomy and Soil Science. Scholarships for graduate studies in tropical soils for Pacific and Asian foreign students as well as for U.S. students are also available through the East-West Center. Information on these can be

obtained from the Admissions Office, East-West Center, 1777 East-West Road, Honolulu, Hawaii 96822.

Research Resources Research programs in tropical soil science at Hawaii are largely confined to the Islands themselves where many conditions can be studied and observed. The Department of Agronomy and Soil Science has available for its use fifteen branch stations for tropical soils research, and the specialized research resources of the Rice Center, the Sugar Planters Association Experiment Station, and the Pineapple Research Institute.

Recent research in soil classification emphasizes completing the analysis of chemical and mineralogical characteristics of the soils of the fifteen branch stations. Soil fertility research emphasizes phosphate requirements of crops grown in highly weathered soils and phosphate absorption by these soils (this effort has a strong tie to the Latin American programs of Cornell, North Carolina State, and Puerto Rico). Soils amendment and nitrogen research projects are also carried out. Current soil physics studies involve the degradation and movement of pesticides in highly weathered soils, salinity relations and management in tropical soils, and evapotranspiration studies.

The Universities of Hawaii and Puerto Rico cooperate on a multi-faceted research program, including the geomorphology and pedogenesis of Hawaiian soils, classification of both Puerto Rican and Hawaiian soils by the FAO system, and comparative studies on the characteristics and management of soils in the two areas. Closely related to this is a USAID Regional Project between Puerto Rico and Hawaii on tropical pasture management.

With the purchase of an x-ray fluorescence quantometer, a Soil, Tissue, and Forage Analysis Laboratory has been developed at the University. Samples from the Pacific Basin, East Asia, and from other members of the Consortium are analyzed here, and local research capabilities are being expanded with its use.

Although graduates and faculty are not presently participating in overseas research, the Department welcomes collaborative arrangements with institutions and agencies in developing countries. Preferred geographic areas for such arrangements are Asia and the Pacific Basin countries.

Information Resources The Pacific and Asian Collection of the University's Sinclair Library, the Hamilton Library of the University, and the Library of the Hawaiian Sugar Planters Association, all in Honolulu, contain extensive materials on tropical soils and crops. Inquiries about the collections and services available for outside use should be addressed to the specific libraries.

Reprints of the more recent technical papers and studies on tropical agriculture and soils prepared by staff members, and abstracts of publications, theses, and dissertations are being issued.

The University has also initiated a series of single page handouts, some in color, on "Illustrated Concepts in Tropical Agriculture." They are of special value in the teaching of tropical soils and plant nutrition, and copies will be available to other universities upon request. They may also be translated into foreign languages and distributed over-

seas. The proceedings of the Hawaii workshop on teaching basic soils, sponsored by the Consortium, is being readied for publication.

Consulting Services Staff of the Department of Agronomy and Soil Science are in consultation with AID in Thailand regarding soil-water research in the Mekong Delta and with AID/Washington in regard to research on paddy management and reclamation, tropical root and tuber crops, aquatic weeds, and tropical pasture management.

About a dozen soil scientists, nearly as many agronomists, and several contractual specialists constitute a broad spectrum of specialized interests in tropical soils and crop production in the tropics. Their professional capabilities include soil management, soil physics, irrigation, soil fertility, crop management, herbicides, soil mineralogy, soil chemistry, soil testing, water science, crop physiology, plant nutrition, plant breeding, cytogenetics, weed control, forest soils, crop production, root crops, tissue culture, and related subject areas.

Inquiries relating to consulting services available may be channeled through the university's 211(d) grant officer in the Department of Agronomy and Soil Science.

SOIL FERTILITY – PHYSICAL AND CHEMICAL PROPERTIES OF TROPICAL SOILS NORTH CAROLINA STATE UNIVERSITY

Grant Program Director: Dr. Pedro A. Sanchez
Department of Soil Science
North Carolina State University
Raleigh, North Carolina 27607

Department involved: Department of Soil Science, School of Agriculture and Life Sciences.

The 211(d) grant-supported program in tropical soil science at North Carolina State University places major emphasis on soil fertility and management, relating plant nutrition to the physical and chemical properties of tropical soils. The program's

geographic focus is on Latin America, although much of the information it develops is applicable to similar ecological areas of other continents.

The University's Soil Science Department has a staff of more than forty professors, which places it among the largest soil science staffs at any university in the world. Of these, an equivalent of a dozen full-time senior scientists are engaged entirely in international

activities, including several stationed in Latin America.

In fulfillment of the program's objectives, six senior faculty members have conducted on-site studies of soil properties in tropical zones, modifications have been in soil science courses to add emphasis on tropical soils, a research program in three major ecological regions of tropical Latin America on soil conditions and requirements is under way, and consultations have been conducted with soil scientists and other agricultural leaders in governmental and foundation organizations serving in tropical regions.

Instructional Resources The various international activities of the University and the Department of Soil Science have enabled teaching staff to incorporate materials and information on tropical soils into a variety of standard courses. Information obtained from on-site studies of tropical soil conditions and from consultation with local soil scientists on the unique properties and management requirements of tropical soils has been used to adjust standard courses to emphasize tropical soils. The basic courses involved are:

- Introductory Soils (interaction of soil forming factors, especially in soils different from those in the continental U.S.)
- Soil Classification (emphasizing criteria for soil classification with the additional knowledge of soil properties in tropical and subtropical regions)
- Soil Mineralogy (structure, composition and behavior of soils with special attention to hydrous oxide clays typical of tropical settings)
- Soil Fertility (soil acidity and liming, with emphasis on fertilization of tropical soils)
- Soil Genesis and Classification (soil profiles and their geomorphic position, with special attention to the Amazon Basin, coastal plains, and the inland savanna of Guyana).

A special graduate course on Characteristics and Management of Soils of the Tropics is offered annually. It presents an analysis of specific soil nutrients and soil problems, describes soil behavior and management under tropical conditions, and details the soil-plant-fertilizer system's performance in tropical management systems such as paddy rice cultivation, tropical savannas, and shifting cultivation. Another graduate course, "Properties and Management of Tropical Soils," is offered annually.

Other instructional resources include an annual Colloquium on Tropical Soils and a Visiting Lecturer Series to which outstanding U.S. and foreign tropical soil scientists are invited. Both activities are open to participation by qualified persons from other areas and universities. The Department also participates in joint endeavors of the Consortium on Tropical Soil Science, such as the summer Institute on Tropical Soils.

Twelve to fifteen of the graduate students in Soil Science normally come from tropical regions, mostly from Latin America and Southeast Asia. Some are supported by their home governments, a few by foundation sponsors, a number by USAID missions, and still others by the university. An average of four assistantships per year are available to qualified graduate students, both U.S. and foreign, who have a career interest and commitment to tropical soil science and closely related fields.

Research Resources Members of the faculty of the Soil Science Department have had more than fifteen years of direct research and operational experience in the tropics. Specific areas of research competence and interest include:

- Tropical soil classification in relation to soil fertility
- Soil nitrogen
- Soil phosphorus, acidity and liming
- Soil fertility evaluation

Tropical savanna management
Soil management under shifting cultivation
Tropical corn fertilization.

Long-term faculty research in tropical soils has been conducted for more than a decade in Peru, and in Brazil, Columbia, Venezuela, Bolivia, Ecuador, and Central America through the International Soil Fertility Evaluation program serving those countries. Through an AID research contract, opportunities for research involvement exist in three sites representative of the major ecological regions of Latin America: the savannas (Brasilia, Brazil), the Amazon jungle (Yurimaguas, Peru), and the volcanic ash regions of the Central American highlands.

Specific plans were developed to do research on soils-related problems in the following countries:

- Guatemala - project completed (nitrogen and micronutrient fertilization in Pacific Coast lowlands and volcanic ash highlands)
- Guatemala - project completed (nitrogen and micronutrient fertilization in Pacific coast lowlands and volcanic ash highlands)
- Columbia (composition and classification of selected soil profiles from rain forest areas in the southeast)
- Panama - project completed (correlation of soil test results with crop response to fertilizer)
- Peru (studies of the properties and management of soils under shifting cultivation)
- Brazil (physical, chemical, and nutritional problems of soils of the Campo Cerrado)
- Costa Rica (soil fertility problems associated with multiple-cropping programs)
- Salvador (nitrogen management investigations on production of forage shrub)

Graduate students supported by the 211(d) grant are expected to conduct a major portion of their thesis research under tropical conditions, especially in the Latin American ecological sites mentioned above. Competence in Spanish or Portuguese is required in such

cases prior to initiating thesis research. An Adjunct professor of the University who is affiliated with the Centro Internacional de Agricultura Tropical in Columbia is available to supervise thesis research in that country. Close cooperation exists with the Tennessee Valley Authority in testing new fertilizer materials in the tropics.

The Soils Science Department has available the most modern equipment necessary for any type of soil research, including computer, greenhouse, and phytotron facilities.

Information Resources An interlibrary loan program with other Research Triangle institutions (including the University of North Carolina at Chapel Hill and Duke University at Durham) permits quick availability to a wide selection of materials relating to the tropics and to agricultural development. Inquiries should be directed to the Director, D.H. Hill Library, North Carolina State University.

The list of research publications on tropical soils prepared by North Carolina State faculty since 1953 currently includes fifty-four titles. The list may be obtained on request from the Soils Science Department.

The publications of the University's International Soil Fertility Evaluation Program are widely distributed throughout the world in English, Spanish and Portuguese. Most of the publications on rice and potato fertilization in Peru are available in Spanish through the National Potato Program, Ministry of Agriculture, Lima, Peru, or the National Rice Program, Ministry of Agriculture, Lambayeque, Peru.

Consulting Services Consulting activities of the Department staff in the last year alone extended to India, Japan, Thailand, the Philippines, Peru, Colombia, and Guatemala. Consultation on general soil fertility programs in the past has extended through much of Latin America, and to countries of Africa, the Near East, South and East Asia. Department staff have also consulted on the establishment of soil testing laboratories in fourteen countries of

Latin America. Other consulting assignments have involved studies of nitrogen research; phosphorus, soil acidity and liming; soil characterization; forage fertilization; potato fertilization; rice fertilization; and advisory services in establishing soil science graduate

courses.

About twenty professional personnel connected with the University's work on tropical soils are available for contractual consultation services.

SOIL FERTILITY: SAVANNA-PRAIRIE ECOLOGY PRAIRIE VIEW A&M UNIVERSITY

Grant Program Director: Dr. J. I. Kirkwood
Department of Plant and Soil Sciences
Prairie View A&M University
Prairie View, Texas 77445

Department involved: Department of Plant and Soil Sciences.

Since its inception, Prairie View A&M University has been involved in the study of savanna soils and the improvement of managerial practices based on the utilization of the coastal prairie of South Texas. These soils have remarkable similarities to the savanna and high plateau of Africa. Moreover, Prairie View has a special interest in the African scene since many of its students are of the black race, although the school has no racial barriers. The total program of the University is developed in coordination with and supported by Texas A&M University.

The University's work in tropical soils emphasizes soil fertility problems of the sub-humid tropics, particularly with respect to the physicochemical properties of savanna-prairie soils and their nutrient status.

An important component of the Prairie View program in tropical soils is its newly established Tropical Soils Resources and Enrichment Center located in the University's Plant and Animal Industry Building. This provides graduate students with office spaces equipped with calculators and typewriters. The Center provides shelving for library and other research materials, and display space for soil monoliths and agricultural tools of different countries. Four auto-tutorial carrels have been installed with auxiliary equipment. The Center also contains extensive audio-visual

equipment, projectors, tape recorders, microfiche readers, a microfilm reading library, and equipment for sound production of slide-tape documentaries.

Instructional Resources Prairie View offers a Bachelor of Science degree in Agriculture, Agricultural Education, Agriculture Economics, and Agriculture Engineering, and a Master of Science degree in Soils, Agricultural Education and Agricultural Economics.

Plant and Soil course offerings in the M.S. program in Soils include the following:

- Soil Microbiology
- Plant Nutrition and Soil Fertility
- Advanced Soil Management
- Seminar
- Soil Mineralogy in Relation to Soil Formation
- Soil Physics
- Tropical Soils
- Soil Fertility Problems of Savanna-Prairie Ecology
- Soils and the Quality of the Environment
- Fertilizer Technology and Usage
- Soil Genesis, Morphology and Classification
- Soil Survey and Interpretation
- Soils Interpretations for Land Use Planning
- Special Problems

Courses in related area include:

- Advanced Pasture and Range Management

Grain and Field Crops Advanced Plant Physiology

Periodically, seminars and conferences are presented on campus such as an inter-institutional workshop in tropical soils which brings together experts in diverse agricultural disciplines with the participation of graduate students from Sierra Leone, Nigeria, India, Haiti, and Guyana. A monthly seminar series dealing with broad aspects of Agriculture and Ecology are presented by representatives of national and state government, outside university staff, and World Bank and FAO personnel.

Financial assistance to undergraduates and graduates include summer employment possibilities in a Traineeship Program, part-time employment, various scholarships, and student loans. Twenty scholarships are available for candidates for the M.S. degree in Soils, Agricultural Education and Agriculture Economics. Seven of these are allocated to students from foreign tropical countries. In this regard the University has established linkages with Njala University College in Sierra Leone (West Africa), IITA (Nigeria), Ministry of Agriculture (Haiti), Ministry of Agriculture (Guyana), and North Carolina State University at Yurimagua, Peru, student and staff exchange. Foreign graduate students with fellowships pay the same tuition as non-foreign students.

Research Resources The research program at Prairie View emphasizes applied research and practicing arts designed to solve the problems of immediate concern. The Prairie View Experiment Station plays a principal role in the research program in plant and soil science, animal science, rural economics and problems of rural poverty in South Texas.

Plant and Soil science research includes soil chemistry and fertility, soil microbiology and biochemistry, soil genesis and classification, and consumer use and marketing of vegetables and fruits. Animal science research includes swine growth and nutrition, beef and dairy cattle management systems, poultry market-

ing and product development, and environmental studies of larger animals for biomedical research. Substantial federal funding for research in socio-economic problems is available for such areas as human nutrition, rural development and poverty, human resource development, economic and social patterns of rural minorities, and overall improvement in rural life.

Special research interest is directed to the peculiar characteristics of the savanna-prairie soils and the environment of the area. Much of the local research carried on has direct reference and applicability to similar soil and climate conditions in tropical savannas in less developed countries. Well-equipped laboratories and associated facilities are available for this purpose.

Linkages with Njala University College in Sierra Leone, IITA (Nigeria), IICA-CTEL (Costa Rica), CATIE (Turrialba, C.R.), IRRI (Philippines) Togo, West Africa (Ministry of Agri.), CIMMYT (Mexico), OSTROM (Paris, France), IRAT (Paris, France), FAO (Rome, Italy), WARD (West, Africa), Surinam, South America (Dept of Development), and Ghana, West Africa (Univ. of Legon and Kumasi-Soils Institute), provide resources for expanding the research program overseas.

Publication of research studies by staff in professional journals is increasing. They include, "Maize, a Second Crop in West Africa," "Lime Requirements of a Plenthis Soil," "Worldwide Rural Poverty: An Agronomist's Concern," "The Development of Generative Competency-Based Instructional Systems in Agronomic Education," "Soils of the Savanna Guabatico-Dominican Republic," "Tropical Savanna-A Potential Frontier for Increasing Food and Fiber," and others.

Informational Resources At the Prairie View Resource Center in Tropical Soils, audio-visual aids and materials are developed relative to tropical soil conditions and characteristics in various areas of the world. By special arrangement these are available for instructional and information purposes through other institutions and agencies. The University also makes arrange-

ments with Texas A&M University for preparation of slides and prints and for publication needs, as well as for duplicating services.

Consulting Services From among present professional staff, consultation expertise is available in the following areas:

Tropical Soil Chemistry and fertility

Soil Management and classification
Biology of tropical soils
Horticulture for tropical zones.

One of the staff members has had extensive experience in West African agriculture, and another in the Asian tropics and with rice culture in Taiwan and Dominican Republic. Other members are experienced in the soils of the West Indies.

CONSERVATION AND PROTECTION OF SOILS OF THE TROPICS UNIVERSITY OF PUERTO RICO

Grant Program Director: Dr. R. Pietri, Agricultural Agent
College of Agricultural Science
University of Puerto Rico
Mayaguez Rio Piedras, Puerto Rico 00928

Departments involved: Department of Agronomy, College of Agricultural Science; Office of International Agricultural Programs; Agricultural Experiment Station.

The University of Puerto Rico's Latin American environment and interests, the unusual range of tropical soils and environmental conditions, and the interlinkage of relationships with both U.S. and Latin American institutions provide an unusual combination of resources available at the Mayaguez Campus.

The various professional schools of the University present a variety of courses dealing with Caribbean and Latin American studies. Moreover, the Office of International Agricultural Programs stimulates direct relations with other developmental activities. This Office is also responsible for developing the curriculum in international tropical agriculture.

Much of the instructional and research activity in tropical soils centers around the University's Agricultural Experiment Station system which has six outlying substations in various parts of the island. The substations are located in areas with different tropical soils and climatic conditions and hence represent a unique variety of environmental factors.

Substantively, the major concern of the grant-support program in Puerto Rico is in the conservation, protection and management of tropical soils for sustained production. Supportive of this concentration, the program is also concerned with characterization and classification of tropical soils as found in actual field conditions, plant nutrient requirements for the production of food crops on different kinds of tropical soils, soil-water-plant relationships, the impact of climatic conditions on soil and crop behavior, water management in tropical conditions, and the economic and soil environments within which soil technology must be applied.

Instructional Resources The Department of Agronomy has a professional staff of 17 scientists; the Extension Service has three full-time professionals dealing with soils, conservation, irrigation and drainage; and 18 of the 52 professional staff of the Experiment Station devote full time to various sub-disciplines of the soil sciences.

Seventeen courses are offered in soil science, and eleven supporting courses are offered by the Departments of Agricultural Engineering, Civil Engineering, Chemistry, Geology, and Horticulture. The recent

development of graduate programs in tropical agriculture has attracted a large number of Spanish-speaking students from Latin American countries.

Graduate assistantships are available for qualified scholars from Puerto Rico, other Latin American countries, and on an exchange basis with other institutions in the Tropical Soils Group. As a consequence of the 211(d) grant provisions have been made for follow-up and continuing contacts with students who have completed their academic work and are on the job in other tropical areas.

The University of Puerto Rico alternately hosts a four-weeks summer Tropical Soils Institute with the University of Hawaii, a program that endeavors to cover all phases of tropical soil science and their interrelationships. Other special conferences and seminars on tropical soils also enrich the instructional resources available on the Mayaguez Campus.

Research Resources The substation system of the Agricultural Experiment Station provides a variety of environmental conditions as well as technical facilities for research in tropical soils. In one recent year twenty-six research projects were under way in the areas of agricultural climatology, irrigation, drainage, soil fertility, soil genesis and morphology, and tropical soils management.

The University is involved in a major project with Cornell University under AID auspices and with USDA cooperating for the development of solutions to soil fertility problems of the humid tropics. The Puerto Rico institution also cooperates with the University of Hawaii on a multi-faceted research program for classification of Puerto Rican and Hawaiian soils and comparative studies of their characteristics and management. The two institutions are also involved together in a USDA Regional Project on tropical pasture management. Other faculty

research is associated with student programs.

The Mayaguez Campus contains laboratories for research and teaching in soil chemistry, soil physics, soil microbiology, and other elements of tropical soil study. Extensive equipment is available, including extractors, balances, hotplates, incubators, autoclave, refrigerators, centrifuges, electronic equipment, instrument rooms, storerooms, greenhouses and lath-houses, as well as office facilities. Specialized equipment includes Super-Centrifuge, X-ray diffraction, X-ray fluorescence, Flame Photometer, Beckman DBG, B & L Spectronic 500, Jarrel-Ash Atomic Absorption, Flame Emission Spectrometer, thin layer chromatograph, paper and gas chromatographs, Technicon Auto Analyzer, and others. Equipment in the nearby Puerto Rico Nuclear Center is also available for soils research.

Information Resources Library and training materials on soil and crop management in the tropics are in process of development with the aid of the 211(d) grant. The teaching and training materials reflect the bilingual character of the University and of the tropical soils program.

Consulting Services The consulting capability on tropical soils available through the University of Puerto Rico includes the following specialties:

- Tropical soil conservation and protection
- Soil fertility and improvement
- Tropical soils management
- Clay mineralogy
- Soil analysis and analytic equipment
- Soil physics and chemistry
- Soil microbiology
- Irrigation and drainage of tropical soils
- Tropical crops and horticulture.

The University is particularly desirous to be of service in other Caribbean and Latin American countries.

Aquaculture and Marine Resources

Although the two institutional programs described in this subsection are not organically interrelated, both are addressing the important problems of increasing food supplies in less developed countries, especially the desperately needed high quality proteins from either fresh water or the sea. The biggest gap in world nutritional requirements exists in high protein foods, and it is altogether appropriate that the grant programs at these two institutions support efforts to increase professional competence in this neglected area of international development.

University	Field of Technical Concentration
Auburn University	Farming of water for harvesting fish, shrimps, clams or any other aquatic crop useful to human diet
University of Rhode Island	Marine resources economics, marine biology, oceanography, ocean engineering, fisherman training, fishing gear research, coastal agriculture, food technology, and marine products processing.

Both the Auburn University program on aquaculture and fish farming and the University of Rhode Island program on the development of marine resources emphasize not only the nutritional aspects but also the economic development potentials of their areas of specialization. Both institutions are internationally known for their significant work in their respective fields. One principal problem, however, has been the scarcity of highly trained professional talent for direct service to economically needy and nutritionally deficient countries overseas. Heretofore such talents have been applied primarily to domestic needs, and thus the central purpose of the 211(d) grants is to develop professional resources which can be channeled to the protein-poor developing countries.

The two grants are managed at AID/Washington by the Office of Agriculture, Bureau of Technical Assistance.

AQUACULTURE AND FISH FARMING AUBURN UNIVERSITY

Grant Program Director: Dr. E. W. Shell
Department of Fisheries and Allied Aquaculture
Auburn University
Auburn, Alabama 36830

Departments Involved: Department of Fisheries and Allied Aquacultures; International Center for Aquaculture, School of Agriculture Agricultural Experiment Station, in cooperation with other related departments.

The term aquaculture refers to the farming of water for harvesting fish, shrimps, clams or any other aquatic crop useful to human diet. Auburn University has pioneered in this field of endeavor and has developed one of the world's foremost training programs. Instructional programs are implemented by the Department of Fisheries and Allied Aquacultures; overseas activities and studies are coordinated by the International Center for Aquaculture; and local research and practical experience are provided through an unexcelled field station. The International Center also provides educational facilities and training to scholars and governmental personnel of other countries.

The program centers on the problems of fish technology and production techniques which have application not only in the United States but also in the disadvantaged nations where low agricultural production is coupled with problems of population pressures, poor nutrition, and weak economies. Location of the programs in the deep South provides climatic and geographical similarities with many countries where aquaculture has a high potential for providing needed rural industry and high-quality dietary protein.

Instructional Resources Auburn University's instructional program in aquaculture proceeds from undergraduate to Ph.D. levels. The Department of

Fisheries and Allied Aquacultures has a staff of twenty-one professional personnel.

In addition to basic and advanced courses in fish culture, courses given by the Department include:

- Limnology of Aquatic Life
- Biological Productivity and Water Quality
- Hatchery Management
- Pond Construction
- Management of Small Impoundments
- Fisheries Biology
- General Ichthyology
- Fish Parasitology
- Fish Diseases
- Management of Streams and Large Impoundments
- Fish Processing Technology
- Fish Nutrition
- Aquatic Communities
- Ecology of Aquatic Plants
- Special Problems in Fisheries and Aquacultures.
- Oceanography.

Some of the above are also continued in advanced courses. One course on Practical Fish Culture provides for three months of practicum in a federal or state hatchery.

In addition to the weekly one-hour seminars offered for credit at the graduate level, special seminars are held periodically during the academic year; many of these are presented by noted fisheries biologists coming from all over the world. The Department's staff also provides lectures to numerous visiting fisheries personnel from developing countries. Slide talks are frequently presented for other University departments and for visiting personnel and groups interested in aquaculture.

Periodically, short courses in various aspects of aquaculture are presented on special request; many of these relate to fish parasites and diseases.

Financial assistance and part-time employment opportunities are available to both undergraduate and graduate students as qualified and in accordance with university policy. In the current year 23 American and 15 foreign students are taking advanced studies in the Department of Fisheries and Allied Aquacultures, and of these ten have received graduate assistantships funded by the 211(d) grant. Quarterly expenses for foreign students are normally paid by USAID sponsorship or the host government. Foreign students must, however, have proficiency in English. In addition to the regular academic programs, Auburn University also regularly offers special non-degree training in fisheries and aquacultures for periods ranging from one month to a year. Academic and personal counseling is available to foreign students on campus, and a special attempt is made to help them apply training content to local conditions of their own countries.

Research Resources In a discipline in which laboratory and experimentation and testing facilities are so important, Auburn's investment in research facilities is especially noteworthy. A million dollar Fisheries Building, and a greatly enlarged laboratory as well as classroom and office space have been completed. The building will also house the Alabama Cooperative Fishery Unit, the Southeastern Cooperative Fish Disease Laboratory, and a scientific ichthyological collection.

Field facilities include 258 earthen ponds, 92 concrete pools, and 366 plastic pools, all with appropriate service buildings and equipment. The experimental ponds are constructed in such a way that each can be filled and drained independently of other ponds in the same complex.

The large staff permits team research effort and sharing of equipment and knowledge. A complete spectrum of field and analytical

equipment is available. Specific areas of research interest and activity include:

- Water chemistry problems in aquacultures
- Fish taxonomy - inventory of species
- Fish feeds and feeding
- Fish parasites and diseases
- Fish and shrimp culture
- Aquatic weed control (chemical and biological)
- Fish technology: processing and preservation
- Limnological surveys
- Reservoir fisheries management
- Riverine fish populations
- Biology and ecology of fish.

Recent and current projects with a research emphasis include activities in eight countries: Brazil, Peru, Colombia, Panama, Morocco, El Salvador, the Philippines, and Thailand.

Studies in Brazil, Panama, El Salvador, and the Philippines are under USAID contract auspices.

Research studies and surveys have also been carried out in Japan, Taiwan, and Hawaii which have highly-developed aquacultures. The Department has served in an advisory capacity to the Israeli Department of Fisheries at Tel Aviv, Hebrew University at Jerusalem, and freshwater fishery stations at Dor and Nir David. Recent shorter term projects have brought staff into contact with Turkey, Colombia, Costa Rica, Nicaragua, Haiti, and Zaire.

Information Resources The International Center for Aquaculture houses an extensive departmental Library of World-wide Literature on Aquacultures which includes nearly all periodicals relating to the subject and a large number of publications collected during the conduct of research activities in Brazil, Costa Rica, Colombia, Ecuador, El Salvador, Panama, Peru, the Philippines, and Thailand. Copies of these publications are also available in the University's main library, which has extensive holdings in the field of aquaculture and closely related

areas. Standard interlibrary loans may be made to cooperating institutions.

Abstracts are made of publications dealing with aquacultures and inland fisheries coming to Auburn from all parts of the world. Xerox copies are made of the abstracts and occasionally of entire articles where they deal with important advances. Copies are sent to fisheries departments in countries having cooperative AID fisheries projects, to USAID agricultural officers, and to other developing countries where AID-sponsored surveys have been made. The abstracting service and copies of the papers are maintained at the International Center; the papers are filed and indexed for rapid reference. Inquiries should be addressed to the Center.

Lists of available publications resulting from research at the International Center for Aquacultures are circulated worldwide to those requesting placement on the mailing list. The present list of available publications contains more than 160 articles dealing with various technical phases of fisheries and aquacultures; thirty-eight such articles and papers

have appeared in professional and technical publications and journals in recent years.

Consulting Services As is apparent from the above, the Auburn fisheries staff has garnered a wide and diverse experience in overseas consultation. Inquiries about availability and specific areas of specialization of individual staff members should be directed to the International Center for Aquaculture. Much consultation activity is performed with support of an AID contract (csd 2270). Specific subjects in which consultation is often provided include:

- Design and construction of aquaculture research or production facilities
- Coursework curriculum development in aquatic sciences
- Water chemistry
- Fish taxonomy
- Reservoir management
- Fish feeds and nutrition
- Fish processing technology
- Fish parasite and disease control
- Aquacultural methodology.

DEVELOPMENT OF MARINE RESOURCES UNIVERSITY OF RHODE ISLAND

Grant Program Director: Dr. John A. Knauss
Provost for Marine Affairs
International Center for Marine Resources & Development
University of Rhode Island
Kingston, Rhode Island 02881

Departments Involved: International Center for Marine Resource Development; Graduate School of Oceanography; Department of Fisheries and Marine Technology, Resource Economics, Animal Science, and Food and Resource Chemistry; Departments of Geography, Sociology and Anthropology, Community Planning, and Ocean Engineering; and The Law of the Sea Institute.

As is evident from the list of departments involved, the grant-supported program at the University of Rhode Island is a multi-discipli-

nary enterprise. The program deals with the complex areas of marine resource economics, marine biology, oceanography, ocean engineering, fishermen training, fishing gear research, coastal/aquaculture food technology and marine products processing, and related economic development opportunities--all of which bring into play a variety of disciplines and sub-disciplines.

The focus of these interrelated elements is the International Center for Marine Resource Development, established in 1969. Its purpose is essentially one of orchestration of numerous kinds of capabilities. Given the practical

emphasis of the fisheries programs of AID, FAO and various development banks which have financed a number of pre-investment and investment programs in the marine resource sector, the University believes that its contribution can best be made in clarification of economic and social issues in marine resource development, institution-building and training, and the development of technical assistance facilities which may be used by less developed countries and thus lead to clearer justification for investment from bilateral and multilateral sources.

The University of Rhode Island has long been recognized as one of the leading academic institutions involved in teaching, research, and extension relating to marine resources generally and marine fisheries and aquaculture specifically.

The multidisciplinary Center encourages the re-integration of these capabilities for a broader and deeper range of service to the needs of developing countries and protein-deficient peoples.

Instructional Resources More than a hundred faculty members, one-seventh of the University faculty, are engaged in marine research, teaching, and extension. Nearly every scientific discipline at the University offers some marine specialization at the graduate level. Some three hundred graduate students are involved in marine-related programs.

Marine science at the University is an orientation and an emphasis, rather than merely a course of study. Actually there are five marine degree programs. The largest is that of the Graduate School of Oceanography located on the Narragansett Bay campus about six miles from the main campus. It has about thirty faculty members and approximately a hundred and fifty graduate students working on M.S. or Ph.D. degrees.

Subsequent to the first Sea Grant national conference sponsored by the University in 1965, four more marine degree programs were established. The College of Engineering offers M.S. and Ph.D. programs in its Department of Ocean Engineering, one of the few in the

country. A doctoral degree program in economics (marine resource option) is offered jointly by the Department of Resource Economics of the College of Resource Development, the Department of Economics in the College of Arts and Sciences, and the Department of Finance in the College of Business Administration. A master's degree program in Marine Affairs, the first of its kind in the country, is another multi-disciplinary effort of a number of departments. Finally, a graduate certificate in development studies is offered as a cooperative program by the departments of Political Science, and Resource Economics together with other social science groups.

At the undergraduate level, the Department of Fisheries and Marine Technology offers a practical two-year commercial fisheries program leading to an Associate in Science degree. It is, of course, impossible within these limits to reflect adequately the wide range of specific courses available in the several programs.

The Law of the Sea Institute located at the University is a major communications agency dealing with marine law and policy. It is internationally recognized as a non-political forum for discussion of the legal regimes of the ocean. It holds annual summer conferences, publishes occasional papers, and supplements the Master of Marine Affairs program.

Assistantships and other forms of graduate student aid are available to qualified scholars through the various cooperating departments and the Center. Requests for information should be addressed to the Director of the Center.

Research Resources Research interests of the program at the University of Rhode Island cover a wide range of factors in marine resource development, from technical aspects of marine fisheries to nutritional considerations, economic factors and opportunities, and social and anthropological elements.

Faculty associated directly with the Center emphasize research which is particularly applicable to the condition of rural coastal and

inshore fisheries and aquaculture in developing countries, in the conviction that these are most in need of developmental efforts rather than the great commercial fisheries. In this context, three program areas have been identified as the focus of technical and research interests of the Center:

1. Economic research, analysis and planning leading to development of coastal communities and their marine resources and fisheries. This includes the planning of coastal land and water use, fisheries sectoral analyses, studies of rural coastal employment, income distribution, credit and marketing, and essential service infrastructures.
2. Marine foods technology development: food science and nutrition and food technology as they relate to the economic and social needs of developing countries, including economic problems of sanitation, toxicity and waste in the processing of marine resource products.
3. Technical assistance and extension activities culminating in working relationships with other bilateral, multilateral and host country institutions, including development of pre-investment and investment projects, assistance to institutions building training and educational programs, follow-up sectoral analysis, rural marketing and trade development.

Information Resources Extensive library holdings on marine technology and fisheries development are maintained by the Center. The material is

presently filed by subject matter, but additional classification and cross-indexing is in process.

Considerable bibliographic work is carried on by the Center. A bibliography of AID fisheries documents has been prepared; in process is a Bibliography of Maritime Social Studies, and an Index of Current Maritime Social Research.

Faculty associated with the International Center for Marine Resource Development are responsible for a wide variety of publications in the subject area, both in book form and in professional journals. For lists and requests for offprints, inquiries should be directed to the Center.

Consulting Services Most of the overseas consultation arrangements of the Center have proceeded in cooperation with other universities and host country institutions.

Allied to such cooperative efforts are the consulting arrangements of the Consortium for the Development of Technology (CODOT), which, in addition to the University of Rhode Island, includes the universities of Washington, California at Davis, Wisconsin, and Michigan State. CODOT is designed to strengthen research and training in "Food Science and Technology for the Augmentation of Food Supplies in Developing Countries." Initial contracts are primarily with Brazil, Central America and Chile. The International Center for Marine Resource Development acts as the contracting and business agent for the Consortium.

Ruminant Livestock Production

Four U.S. Universities receiving 211(d) grants have formed a consortium to enable them to collaborate in studies of the complex and interrelated problems of livestock nutrition, breeding, disease control, marketing, credit availability and so on. This association will enlist the strengths of a multi-disciplinary and inter-institutional effort to increase U.S. competency in the broad field of ruminant livestock systems for the wet dry tropics and subtropics. The defined fields of concentration are as follows:

University	Field of Technical Concentration
Texas A & M University	Breeding and disease control
University of Florida	Nutrition, forage production and use
Purdue University	Systems analysis of the livestock subsector
Tuskegee Institute	Design and execution of ruminant livestock development plans

Institutional concentration on these fields reinforced by inter-communication among the universities is intended to combine the advantages of specialization with the progress that can be gained from mutual exchanges of information during the development of projects. Guyana was chosen as a suitable country for a focus of initial institutional efforts.

Staffs of the four members of the consortium had to be built-up to carry out the functions of the 211(d) grants. These staffs were called upon to identify problems and develop plans to overcome them; to develop research activities; to organize new courses or adapt existing ones; to support student and faculty interchanges along predetermined lines worked out in consortium; to strengthen libraries; and to participate in seminars, workshops and conferences on systems approaches to their assigned phases of the total livestock production effort.

The grants are managed at AID/Washington by the Office of Agriculture, Bureau of Technical Assistance.

CONSORTIUM CONCLUSIONS

Representatives of the Livestock Consortium universities met to discuss principles of systems model building at which the following considerations bear repeating to better define the challenges and the resources involved:

1. The non-biological aspects (i.e. sociological and extension) of a beef model should be part of the model.

2. The model should indicate the lines of research needed to gain more profitable response. (Priorities could influence land use in the next one or two decades. Good land may be used for crop production forcing ruminant livestock to be raised on poorer lands).
3. Major emphasis should center on a micro-model unit, or some other defined unit (i.e., an economically feasible unit, or a livestock unit).
4. Predictions should entail the uses of various lands.
5. Disease aspects are important to the model. (Hoof and Mouth Disease may drop production by 25-50%).
6. The applicability of the model to any situation will be influenced by the quality of the available data.
7. Sociological Implications:
 - a. Demographic analysis as it relates to population and resettlement schemes.
 - b. Social Survey of groups of population within the country:
 - 1) Socio-Economic profile
 - 2) Current agricultural practices (competency)
 - 3) Incentives
 - a. Attitude toward cooperatives
 - b. attitude toward resettlement
 - c. Understanding the governments' role in beef cattle production as it relates to other agricultural programs and resettlement schemes.
8. Extensions' role should include an evaluation of education capabilities as they relate to the improvement of livestock production (i.e., requirements for meat inspectors, nutritionists, etc.).
9. What should be proper investments for Guyana? What further research is needed? How should the order of priorities for production be indicated?

At this reporting stage, it must be remembered that the consortium project is just getting under way as special problems relative to a coordinated effort of four separate universities, plus the involvement (proposals, agreements, arrangements, etc.) of the Government of Guyana are time consuming exercises wherein much attention was necessarily devoted to meetings, conferences, symposia, etc. It is nevertheless anticipated that the initial probes will stimulate a rapidly accelerating momentum and that the program will prove most valuable to tropical countries, which have potential ruminant livestock development capabilities.

**BREEDING AND DISEASE CONTROL
TEXAS A & M UNIVERSITY**

Grant Program Director: Dr. Jack D. Gray
Director, International Programs
Texas A&M University
College Station, Texas 77240

Department Involved: Department of Animal Science, Institute of Tropical Veterinary Medicine

The grant to Texas A&M is designed to strengthen and expand their special competence in livestock development programs in the tropics, emphasizing ruminant livestock production systems through improved breeding and disease control projects.

Instructional Resources Six hundred and thirty-nine foreign students are currently enrolled at the University. About 50 full time staff members are working abroad. Nineteen fields of study are available in the College of Agriculture to back up the 211(d) grant program.

The Institute of Tropical Veterinary Medicine trains foreign and domestic students and maintains laboratories in tropical countries. The Department of Animal Science is organized into a number of sections including Animal Breeding, Ruminant and Non-Ruminant Nutrition; Meats; Meat Chemistry; Physiology of Reproduction; Beef Cattle; Swine; Sheep, Goats, Wool and Mohair; Horses; Dairy Production; Dairy Manufacturing and Food Science and Technology. The International Programs of the University has a cadre of 200 faculty and staff members experienced in international development.

Research Resources A Guyanese animal disease diagnostic laboratory is programmed by the local government and is to be equipped through FAO funds. This will permit accurate surveys.

At Texas A&M, seven institutes are engaged in significant research programs including The Institute of Food Science and Engineering. The Institute of Tropical Veterinary Medi-

cine, and others centering upon water resources, statistics, transportation, theoretical physics, a cyclotron, etc. all of which can be called upon to contribute to the 211(d) grant objectives. Through interviews with local veterinarians the presence of a wide range of animal diseases have been identified as present in Guyana. These are listed here to indicate the alarming range of challenges faced by the research resources of the university to reduce and hopefully eliminate much of the destructive livestock diseases presently plaguing many of the tropical areas. Guyana and elsewhere: Anthrax, Blackleg, Tetanus, IB, Hemoprotozoal Disease, Mal de Caderas, Rabies, Mineral Deficiencies, Foot and Mouth Disease, Brucellosis, Bovine Reproductive Disease, Leptospirosis, Marek, Eryejelas, Hog Cholera, Parasitic Diseases, Lung Worms, Kidney Worms, Hemonchosis, Coccidiosis, Pasteurellosis, Screw Worm, Venezuelan and Eastern Encephalomyelitis.

A number of agricultural stations and livestock production areas in Guyana are readily accessible to those engaged in research studies, and have proved useful to both consortium and Guyanese veterinarians for pursuing some of the grant objectives.

Information Resources Although the Veterinary College library contains some 7,134 reference books and texts on veterinary subjects, and active files are maintained on some 14,566 bound copies of 459 different medical journals, it was felt necessary to develop a special library on tropical veterinary medicine readily available to staff and students. Consequently, the college has accumulated 33 reference books, 29 reports, 497 reprints of technical papers and 8 theses and dissertations.

Training aids prepared include sets of Kodachrome slides on many animal diseases. The Animal Science Department is currently increasing a library of a variety of training aids in all disciplines. Exchange of information programs continue to broaden the knowledge base.

The University itself, includes a major library, five branch libraries, a Data Processing Center equipped with an IBM 360/65 computer in addition to the categorized materials maintained by the various departments.

Consulting Services Salaried faculties of the Animal Sciences Department are available as consultants, or to

render technical assistance as required by the various Tropical Livestock Production programs.

The University will accommodate grant program requests for technical assistance and/or consulting services which are relevant to animal agriculture in the wet/dry tropics, as considered feasible by releasing staff for assignments in specialized areas of animal agriculture, or by assigning qualified students for activities that would contribute to their training.

Inquiries relating to consulting services available may be channeled through the University's 211(d) grant office.

NUTRITION, FORAGE PRODUCTION AND USE UNIVERSITY OF FLORIDA

Grant Program Director: Dr. H. L. Popenoe
Center for Tropical Agriculture
University of Florida
Gainesville, Fla. 32601

Departments Involved: Department of Animal Science, Department of Agronomy, Institute of Food and Agricultural Sciences, Center for Tropical Agriculture

The University of Florida contributes its expertise to the "Nutrition" and "Forage Production and Use" elements of the total livestock production and marketing systems goals. Their Center for Tropical Agriculture provides the Institute of Food and Agricultural Sciences (IFAS) with a formal framework to coordinate the increasing involvement of the Institute in International programs.

Florida's sub-tropical location has led to close ties with the rest of the tropical world, and initiated a large segment of the faculty of IFAS into gaining on-site experience in teaching, research and extension inputs into specifically oriented tropical problems. The 211(d) grant builds upon the university's unique qualifications in both tropical experience, and in its record of performance in dealing with

animal nutrition and forage production problems.

Instructional Resources Resident instruction for in-depth training includes such courses as:

- Principles of Animal Breeding
- Beef Cattle Science
- Animal Nutrition
- Animal Production in the Tropics
- Reproduction in Farm Animals
- Tropical Pasture and Forage Science
- Crop Plants in Tropical Environments
- Management of Farms in Tropical Areas
- Agriculture's Role in the Growth of Latin American Nations
- Tropical Soils and Their Environment
- Tropical Soils
- Parasitic Diseases in the Tropics and Sub-tropics
- Forage-Livestock Feeding Programs
- Cropping Systems for the Tropics
- Agriculture and Rural Development Administration

Non-degree short courses, training seminars, exchange of student programs, conferences, etc., are continually in progress.

About 35 percent of the graduate students in IFAS are from other countries.

Many of these courses utilize field research as a training device for students who plan careers in tropical agriculture.

Research Resources The development of production parameters through research with beef cattle, pastures and forages are conducted at the Ebine Research Station in the intermediate savannahs of Guyana.

Research probes at this station focus on grass and legume introductions, temperature and seed production parameters, flooding tolerances, digestibility of different grasses, etc. Such studies have furnished research data which are applicable to the development of micro-models suitable for evaluating production systems at the herd level and macro-models at the country level.

The Departments of Animal Science and Agronomy and the Center for Tropical Agriculture and Tropical Animal Science continue in combining teaching and research programs.

Information Resources Published reports of value to those engaged in livestock production in tropical environments are readily available. The results of research studies which have been completed and those which continue to be conducted include, but are not restricted to:

- 1) Information about adapted species and varieties of legumes and grasses for ecological zones of the tropics.
- 2) Estimates on nutrient requirements of various feed crops (including forage), and their responses to fertilizer nutrient inputs to the system.
- 3) Recommendations on appropriate grazing management systems to maintain a balance of legumes and grasses in mixed swards.
- 4) Information on cropping systems.

- 5) Estimates on the quality of native and introduced forages.

- 6) Information on responses to mineral supplementation, and to protein-energy feeds as supplements for native ranges and improved pastures.

- 7) Estimates on direct effects of various inputs-nutrients and nutritional levels, calf survival, rate of gain, age of slaughter and economics of production.

One of the most effective means of information transmission derives from the University of Florida's work with many visitors who arrive singly and in groups to discuss tropical livestock, pasture and forage programs. Many come from LDCs.

Consulting Services Short term consultants from the University offer assistance to the on-going program in Guyana. Their expertise ranges over a wide spectrum of subjects related to cattle production.

Various units within the University complex are expected to accommodate requests for technical assistance and for consulting services relevant to animal agriculture in the wet/dry tropics and are obligated under 211(d) arrangements to make available, when feasible, staff members for assignments in specialized areas of animal agriculture, and to assign qualified students for activities that would contribute toward their training. The University of Florida stages many conferences which include out-of-state participating experts, and university professors from other countries, thereby offering significant opportunities to share their expertise.

The University's competence in "Nutrition" and "Forage Production and Use" holds especially high esteem by its Latin American friends.

Inquiries relating to consulting services available should be channeled through the University's 211(d) Grant Officer.

SYSTEMS ANALYSIS OF THE LIVESTOCK SUBSECTOR PURDUE UNIVERSITY

Grant Program Director: Dr. Woods Thomas
Department of Agricultural Economics
Purdue University
West Lafayette, Indiana 46207

Departments Involved: School of Agriculture,
Department of Agricultural Economics,
International Programs in Agriculture,
Purdue Research Foundation and Agri-
cultural Experiment Station

Purdue University concentrates on the analysis of systems of production and marketing in the different environments of the LDCs. Such analysis describes the systems, indicates the factors that most seriously limit development, and suggests alternative policies and programs to remove them. Special attention accrues to technical information and research management as integral parts of a system. The specific grant to Purdue is oriented around research to: 1) adapt the systems analytical techniques to other institutions, 2) improve analytical technology and 3) increase the number of Faculty economists and others in the consortium who will then have had experience in this area.

Purdue University's qualifications for those roles include wide experience in Agricultural Economics, a faculty well represented in overseas involvement, a background of significant contribution to the advance of technology, and to improvement in the use of resources in agriculture, here and abroad.

Instructional Resources The University's instructional resources are extensive, but the thrust of this program is on research and so the 211(d) grant project reported here places lesser stress on its instructional capacity. However, the project is supported by use of the University's facilities-offices, classrooms, laboratories, auditoriums, libraries, etc. The libraries, for example, include on-campus facilities as well as access to a Center for Research Libraries which in a Consortium of 30 university

libraries. University computers are available at normal charges, and faculty are always on hand to respond to specific requests directed to them.

Research Resources The objectives of the Government of Guyana on which Purdue University places special emphasis centers on a careful assessment of ruminant livestock development prospects in that country, in terms of:

- a. The competitive advantages of beef, dairy, sheep and goats.
- b. The development of potential of the various regions of Guyana.
- c. The determination of what grasses, legumes to grow for forage purposes; what husbandry techniques to use; the sizes of individual farm holdings; health; the methods of marketing and distribution.

The work plan components are:

- a. Computer models of beef production on an individual herd basis for each of Guyana's major ecological zones, and
- b. A "macro" model of livestock (beef, dairy, goats and sheep) production possibilities in the major ecological zones, and consideration of the overall limitations to growth (breeding stock, available capital, etc.)

Such models assist the Guyana Agricultural Sector Development in achieving goals of increasing production and marketing of specific commodities to a level of self-sufficiency so that Guyana can maximize the export of those agricultural commodities for which it has a competitive advantage. Also,

such research models point the way to allocate development investments equitably among the regions; to create thousands of new agricultural employment opportunities; and to increase and distribute income in the agricultural sector more equitably between larger and smaller agricultural producers.

Supplementary studies target on strengthening the total efforts of the four university consortium. Those studies center on a survey of the more serious bovine parasites and diseases; on breed evaluation; export market surveys; extension programs for reaching young adults, part-time farmers, cooperatives; and on a cattle producer profile a sociological survey of their life patterns (size of enterprise, resources, location, educational level, goals, etc.).

The development of such models provides an excellent vehicle by which the expertise of the various disciplines represented in the consortium can be shared and focused in a systematic way on problems of tropical livestock development. The research challenges of this assignment are most extensive and extremely impressive.

The research techniques employed, the skilled analysts who utilize them, and the resultant findings are major resources contributing to LDCs and other areas which can profit by newly introduced or expanded ruminant livestock industries.

Information Resources Purdue University has accumulated 131 reports, articles, theses, models, studies, books, etc. to add to its main library. Two

reports evolving from the effort in Guyana are: "Notes on Modeling as an Aid to Setting Priorities in the Context of the Guyanese Livestock Economy" and the other, "Reports of the Ruminant Production Situation and Prospects in Guyana" considers the potential for increased production in the different regions and focusses on feeds, prices, markets, government policies, management systems, etc.

The breadth and depth of faculty expertise in analysis of tropical livestock development problems is constantly enhanced by the sponsorship of lectures and workshops, by improvements to Purdue's library collection of relevant literature, and by the integration of that experience gained from the 211(d) research thrusts into ongoing teaching and research programs at the University.

Consulting Services As spelled out in all 211(d) grants relating to the Ruminant Livestock Development Programs for the Tropics, should technical staff or consultant services relevant to animal agriculture in the wet/dry tropics be requested, the release of qualified staff members for this purpose is ordinarily effected.

The pertinent expertise in this university customarily originates in the Department of Agricultural Economics, International Programs in Agriculture, the Agricultural Experiment and/or the School of Agriculture.

All requests for such support should be directed to the AID 211(d) grant Officer.

**DESIGN AND EXECUTION OF RUMINANT LIVESTOCK DEVELOPMENT
PROGRAMS FOR THE TROPICS
TUSKEGEE INSTITUTE**

Grant Program Director: Dr. M. A. Maloney
Department of Agricultural Science
Tuskegee Institute, Alabama 36088

Departments Involved: School of Applied Sciences, Carver Research Foundation, School of Veterinary Medicine

Tuskegee Institute's strong integrated programs in rural sociology, animal health and livestock production, plus considerable experience in tropical areas abroad, enables it to select locations for problem setting, identifying deterrent forces to livestock development in that setting and seeking means to overcome these constraints, particularly where they are of a sociological nature. The 211(d) grant targets on increasing the institute's capability to assist development programs in the design and organization of systems for the delivery of information and inputs to livestock producers which insure orderly development of a ruminant livestock industry. The capability for handling technical information, integrated and packaged for a given locale must be appended by the ability to adapt such systems to other cultural, social, economic and physical environments. The locale determined by the consortium for the focus of initial attention is Guyana.

Instructional Resources Tuskegee's "Guyana Ranch Management and Livestock Production Program" is working with its third group of trainees from Guyana. It is a non-degree program which provides opportunity for selected trainees to study all phases of livestock production, and includes practical experience in swine, dairy cattle, beef cattle, livestock and farm management, meat processing, pasture and forage production, agricultural extension methods and animal health. Sufficient theory is provided to make the practices meaningful. Trainees are selected on the basis of previous agricultural knowledge, experience, aptitude, and on a genuine interest in being stockmen.

Tuskegee Institute was associated with a teacher training program in Liberia, and several Department faculty members have participated in technical programs in Ghana, Congo, Nigeria and Kenya, Mali, Senegal and Mauritania.

The Institute enrolls many students from overseas. They come from Bahama, Bermuda, China, Ethiopia, Ghana, India, Jamaica, Liberia, Nigeria, Pakistan, Sierre Leone, South Africa, West Indies, Bolivia and Thailand. Many of those studying at the School of Veterinary Medicine enrolled in DVM degree programs.

Undergraduate students who have satisfactorily completed a four year bachelor's degree course in Animal Science may continue into graduate studies for Master of Science degrees in several phases of Animal Science. Those who plan to study Veterinary Medicine are offered a two year program in pre-veterinary studies in the Animal Science Department. The School of Veterinary Medicine awards them a bachelor's degree in Animal Science after two years of the professional curriculum.

The various institute programs involve nearly 1,000 personnel, one third of whom make up the teaching faculty. Tuskegee Institute has long been party to comprehensive human resource development programs for the indigent and for those professionals who wish to continue education activities.

Under the 211(d) grant, Tuskegee provides the usual administrative costs and salaries, access to research facilities and laboratories, library facilities, offices, classrooms, auditorium use, and so forth. Consultations with faculty members (even those not directly associated with the grant) are available.

Research Resources A number of field stations throughout Guyana conduct research investigations on livestock production, crops production, dairy problems, quarantine and diagnostic programs and studies originating in abattoirs. Tuskegee either participates in many of these research activities or benefits by close contacts with those engaged in them.

The Animal Science Division of the Department of Agricultural Sciences had relevant experience in tropical countries, and has created a "systems model" of beef production which contributes to a "overall development systems model" and stresses the specific inputs required from the Institutes' various disciplines.

Several research activities carried on outside of Guyana by Institute members contribute to the 211(d) grant efforts. For example, a Tropical Livestock Development Program initiated with a pretical beef cattle ranch and demonstration farm in Swaziland has direct value to the grant objectives.

The Human Resources Development Center is a broad based unit at Tuskegee Institute and is responsible for the coordination, development and administration of out-reach and non-credit programs. The Center enables the Institute to extend its out-reach programs geographically to every area of social and economic concern here and abroad, and entails added dimensions to the research involvements of the Institute.

Information Resources A series of studies of hemoprotozoal diseases of animals in Guyana, studies of the livestock industry in Southeast Africa and UNDAP programs in Southern Africa contribute to base line information essential to Tuskegee's assignment.

The library of Tuskegee Institute is avail-

able. Relevant textbooks have been purchased and added to the usual library resources. Faculty and Student exchange mechanisms with other 211(d) grant university members increase consortium competency in tropical livestock production. Contacts have been made with several South American and African countries for such exchanges, with increased knowledge of production problems in prospect.

Consultation Services Requests for the provision of consultation advice and services of the professional staff of Tuskegee Institute will be honored whenever feasible. Their contributions should center on developing delivery systems for technical information packages on ruminant livestock development programs that are compatible and adaptable to the social, cultural and economic patterns of the LDC's. In cooperation with other members of the Consortium, this expertise should include

1. The study of animal agriculture and marketing systems, emphasizing the use of technology, and methods of delivery of technology.
2. The study of delivery systems in-place, including the degree of acceptance by farmers and identifications of weaknesses in the system.
3. The utilization of data collected from studies to establish guidelines, policies and operational procedures for the implementation of a "systems approach" to livestock production.

For assistance in obtaining consulting services, contact the 211(d) grant office for Tuskegee Institution.

Soybean Production

The world food picture does not present a pleasant prospect for many regions, especially the over-populated areas in the tropical belt. There is a major lag in research and production in the tropics for legume crops, many of which are excellent sources of cheap, high quality vegetable protein. Therefore, two grants were initiated to strengthen the existing competencies of the University of Puerto Rico and the University of Illinois to develop linkages in a mutual attack on the problems of soybean production for tropical and sub-tropical areas which hopefully will alleviate protein deficiencies in those areas. The universities will carefully coordinate their programs but at the same time will focus activities as indicated below:

University	Field of Technical Concentration
University of Puerto Rico	Disease control and related insects and cultural practices
University of Illinois	Improvement of soybeans for the tropics and sub-tropics

Soybeans are well suited to meet the challenge of nutritional shortages. They are about 40 percent protein, hold excellent nutritional balance, can produce large quantities of edible fats, and are capable of high yield. Presently, soybean culture is concentrated in the United States and China, with significant additional production in Brazil, Indonesia, Mexico, and the Soviet Union. More than 90 percent of the world's supply is grown at latitudes greater than 30 degrees. Recent evidence shows that soybeans can grow in tropical and sub-tropical latitudes including many of the regions which desperately need more protein for human diet. However, additional information is needed on the cultural requirements of the crop, and improved varieties are needed which are better adapted to tropical temperatures. Mechanisms for disseminating information and new high production seed stocks are also needed. Further, technical personnel require training in modern techniques of growing soybeans in the lower latitudes.

These 211(d) grants encourage linkages with major international centers in the tropics, as well as with leading soybean-producing countries. Domestically, close linkage is being maintained with the USDA soybean program, particularly with groups at the Regional Soybean Laboratory, Urbana, Illinois, and with scientists at Stoneville, Mississippi, with scientists at Gainesville, Florida and other locations.

The grants are managed at AID/Washington by the Office of Agriculture, Bureau of Technical Assistance.

**SOYBEAN PRODUCTION
UNIVERSITY OF ILLINOIS
IMPROVEMENT OF SOYBEANS FOR TROPICAL AND SUBTROPICAL AREAS
University of Illinois at Urbana-Champaign**

Grant Program Directors: Dr. W. N. Thompson and Dr. C. N. Hittle
Office of International Agricultural Programs
College of Agriculture
Urbana, Illinois 61801

Departments Involved: Primarily Agronomy, Plant Pathology, and Agricultural Entomology but the following departments are also involved in the International Soybean Program (INTSOY) Agricultural Economics, Agricultural Engineering, Food Science, and the School of Human Resources and Family Studies.

Through AID-sponsored contract work in India, and through the International Soybean Program (INTSOY), the University of Illinois has assisted local research personnel in undertaking soybean trials in a number of tropical belt countries a significant factor in selecting the University of Illinois for pursuing greater competency in this field of activity.

Illinois provides leadership in basic and advanced aspects of soybean improvement.

The University of Illinois' long experience (since 1920) in soybean research has witnessed the growth of an outstanding staff, excellent laboratories, research facilities, library support, and all the infrastructure needed for a major international program in soybean research, development, utilization, and linkages. Virtually all departments of its College of Agriculture are involved with some phase of research and teaching activities related to soybeans. Faculty members from several other Colleges also have expertise that is being drawn upon in the International Soybean Program (INTSOY).

Instructional Resources Offices, classrooms, and space for special meetings are available to the grant program as required. During the course of the grant, approximately 12 man-years of graduate

assistants are to receive training at the University of Illinois, the University of Puerto Rico, or other appropriate sites. Their training will be at an advanced degree level. Typically, a student is to spend a first year at the Illinois campus, largely in classroom study, but with some research activities. The second year is to be spent on field service in Puerto Rico or at another appropriate research and training institution in a tropical environment. The student then returns to the Illinois campus to complete his studies and his thesis. Students completing this program should have excellent preparation for service in overseas development programs and related activities.

It is difficult to separate out-training from research in this program as it has a strong focus on actual participation of both staff and graduate assistants in all phases of soybean improvement work in the tropics, and field experience in tropical surroundings is encouraged through the two university ties.

There are many advantages to be gained from cooperation and interchange between the two universities in this present partnership. Specifically, the Illinois staff and graduate students have an established tropical operating base and facilities in Puerto Rico. Graduate students from Puerto Rico, and some junior staff, have opportunity to receive formal training at Illinois. In the study programs of such individuals, strong emphasis is directed toward fundamental preparation for careers in tropical crop improvement and in technical assistance to LDCs.

The program planning calls for multi-year training activities such as seminars and workshops, and provides for a visiting staff and for other activities related to tropical soybean development. This includes incorporation of

appropriate subject matter into courses at the undergraduate and the graduate levels.

Research Resources The USDA/ARS Regional Soybean Laboratory, located on the campus at Urbana-Champaign, is a principal Federal activity for research on soybean improvement. Twelve professional staff members and about 20 sub-professional technicians devote full-time to research on soybean breeding, physiology, pathology, weed control, and harvesting. Activities of the project are closely coordinated with those of related university departments. All professional staff members of the project have joint University appointments and are available for consultation, cooperation and supervision of graduate student research.

Specialized equipment available at Urbana-Champaign includes Varian Nuclear Magnetic Resonance equipment for rapid, non-destructive analysis for oil content, automatic amino acid analyzers, gas liquid chromatographs, and other apparatus required for the most sophisticated research.

In 1969 the College of Agriculture began to organize the international soybean activities into what is now known as the International Soybean Program (INTSOY). The program, part of the College's Office of International Agricultural Programs, operates under a Program Director who has wide experience in international technical assistance and institution building, and with the cooperation of seven departments of the College. It coordinates an extensive series of soybean varietal and cultural practice experiments in tropical and subtropical areas, supports a limited program of worldwide attention to insects attacking, or associated with, soybeans, and conducts and demonstrates pioneering approaches to the direct utilization of soybeans for human food.

Work under the grant is concentrated in the Department of Agronomy, and more specifically, in those crop science areas most closely related to varietal improvement. Specific items to receive research and training attention will include: (a) germ plasm evaluation

for protein and adaptation to tropical conditions; (b) effects of combining tropically-adapted soybean types with high-yielding, agronomically desirable types from other areas; (c) dynamics of plant growth; (d) genotype and environmental interactions, especially as pertinent to changing seasons and varying rainfall regimes; (e) maintenance of seed quality under tropical conditions; and (f) special problems of disease and insect reactions and their application to plant improvement.

Activities under the grant will be carried out in close cooperation with staff members of the University of Illinois who concentrate on soybean investigations. This includes staffs of the Departments of Agronomy, Agricultural Entomology, Plant Pathology, and Food Science. Advice and assistance on problems of production and marketing economics calls on the cooperation of the Department of Agricultural Economics; harvesting and storage calls upon contributions of Agricultural Engineering.

In time, the University of Illinois expects to establish an International Soybean Resource Base to operate with multinational financing. It is proposed that this be a crop-oriented international research, training, and technical assistance agency.

Information Resources The grant makes provision for use of the University's library facilities, the third largest in size among United States universities. It is the largest library among United States public institutions. Computerized information retrieval systems are a special feature of the library operations.

Recently, experience with such facilities has been utilized by the current program to organize computerized information storage and retrieval systems for the University soybean insect collection which is the largest in the world, and the USDA world soybean germ plasm collection.

Access to needed laboratories, equipment, field research facilities and libraries is a usual provision to the grant program. Also, access

to computer facilities is possible under normal University policies.

Consulting Services Consulting services of faculty members who work in fields related to the program covered by the 211(d) grant are offered as a contribution of the University of Illinois, and obviously such expertise is abundant--particularly as mentioned above--in the fields of plant breeding, crop production, weed control, plant physiology, insect and disease problems, food utilization, production and marketing economics, harvesting and storage.

The signing of agreements for that phase of the project on *Improvement of Soybeans for Tropical and Subtropical Areas*, to which the University of Illinois directs its attention, is too recent for substantive progress reporting at the present.

As cooperative arrangements with the University of Puerto Rico and organizational stages of so challenging a program are time-demanding exercises, it is anticipated that later reports will reflect further developed resources.

**DISEASE CONTROL AND RELATED INSECTS & CULTURAL
PRACTICES OF SOYBEANS, FOOD LEGUMES FOR
TROPICS & SUBTROPICS
UNIVERSITY OF PUERTO RICO**

Grant Program Director: Dr. Raul Abrams
College of Agricultural Sciences
Mayaguez, Puerto Rico 00708

Departments Involved: College of Agricultural Sciences, Department of Plant Pathology and Agronomy; and the Food Technology Laboratory. Field stations involved include the Federal Experiment Station at the U. of Puerto Rico Experiment Station, and those at Isabala, Coroza, Rio Piedras Gurabo, Adjuntas, Ponce, and Lajas.

The grant to the University of Puerto Rico concentrates on the disease control aspects of these problems by increased capabilities in training, research, information linkages, technical assistance and consultation inputs directed toward limiting diseases and associated insects, and introducing cultural practices of soybeans and other food legumes for the low income areas of the world.

The grant, combined with that directed to the University of Illinois (which stresses the breeding aspects of the challenge) is designed to encourage higher yields through the full use of year round growing weather, combined with high yielding adapted cultivars and the

production of superior multiple resistant plant populations and the perfection of improved cultural and management practices.

The University of Puerto Rico's qualifications for this assignment were proved out by previous production of such other legume crops as field beans and pigeon peas.

The major items to receive research attention are the screening of cultivars for resistance to limiting diseases, protein and aluminum toxicity and efficiency in utilization of minor elements such as Zn, Cu, and Mn. Other items to be studied are weed control; pre and post emergence herbicide treatments suitable for the tropics; plant population and date of planting studies which help design a soybean ideotype for the tropics; soil and water management practices; drought and excessive moisture tolerance; fertilizer studies and nitrogen metabolism with emphasis on rhizobium nodulation.

Training of personnel involved in soybean production is, of course, a major function of the grant assignment.

Instructional Resources The Mayaguez Campus is a Land-Grant Institution and a fully accredited member of the Middle States Association of Colleges and Secondary Schools. Spanish and English languages are used by faculty and technical personnel which especially qualifies the university for work with Latin American countries. The College of Agricultural Sciences of the Mayaguez Campus performs three basic functions—resident education, research and extension. It has more than 100 scientists holding Ph.D. degrees on its staff and offers courses in areas closely related to the grant's objectives.

New professional staff, strengthened by the grant will establish programs centered on soybean improvement and production management with special emphasis on diseases and associated insects, as well as improved cultural practices for specific environments.

Six assistantships will be made available to qualified graduate assistants (foreign, U.S. and Puerto Ricans) who have a career commitment to tropical crop production and management, specifically legumes like soybeans and closely related fields. Three of these may advance further under resources made available from other sources such as private foundations, USAID-Missions, FAO, etc.

Exchange programs will permit students at the University of Illinois to round out their studies on soybeans at Puerto Rico. The grant permits candidates for advanced degrees from U. of Illinois to complete their theses research or to solve professional problems in a tropical environment. The grant also makes the exchange program go in the other direction—the sending of U. of Puerto Rican students to the U. of Illinois for continuance of their studies.

Even though special training and short courses are not necessarily funded by the grant, the additional resources permit a response to requests for individualized training if supported by other sources, even if the students are not enrolled in degree courses.

Graduate Assistants will take required course work at the University to gain experience in experimental techniques and to enable them to be responsible for subsequent

tropical field assignments in the furtherance of soybean production improvement, disease and related insect control, and production management knowledge designed to satisfy requirements for their graduate theses.

Research Resources In addition to research on the Mayaguez Campus, College of Agricultural Sciences' work on the college campus, branch experiment stations provide a wide area of different ecological sites totalling more than 2,500 acres available for field work supported by adequate laboratories, and technical personnel will be equipped to handle almost any kind of research with soybeans. These are located in Isabela, Coroza, Rio Piedras, Gurabo, Adjuntas, Ponce and Lajas.

The College of Agricultural Sciences is also involved in a Consortium arrangement of Universities with Cornell, North Carolina, Hawaii and Prairie View at Texas, under the auspices of A.I.D. for enhancing the competence of those institutions for teaching, research, service and consultation on soils of the tropics and their use for food and fibre production. The research program for these grants provides basic soil information required by the soybean project. This represents a vitally important research input, since many areas of the tropics will remain incapable of achieving their food production goals until adequate soil management practices are developed and adopted.

In addition to the above mentioned facilities, the College of Agricultural Science maintains close contact and cooperation with the USDA Federal Experiment Station at Mayaguez. Such advantages as laboratories, technical and support personnel and farms in the nearby area make this station one of outstanding support to the soybean program, especially useful to the University of Puerto Rico's emphasis on disease studies and related insect problems of food legumes.

The Puerto Rico Nuclear Center, a research and training institution sponsored by the Atomic Energy Commission, is operated by the University. The scientific, technical and administrative staff consists of 111

professionals whose research activities open up advanced training possibilities in the application of nuclear techniques to problems in tropical agriculture. It is expected to prove that possible modifications of specific inheritance factors by irradiation may contribute to developing improved resistance and yield characteristics.

Inasmuch as the University of Illinois is far removed from a tropical environment, its collaboration with the University of Puerto Rico is beneficial to both institutions. The research programs therefore stress such fields as Pathology, Entomology, Crop Improvement and Production Management under tropical environment conditions.

It is proposed that the program will develop with collaborators those research topics to be undertaken by graduate assistants and staff. Both the Universities of Puerto Rico and Illinois, plus cooperating national and international research centers hope to increase their competence in soybean cultivation for the tropics, and in gaining acceptance of this commodity as a major food crop.

Information Resources The availability of teaching and training materials on soybean production, management and utilization in the tropics is rather limited. The grant provides support for some of the aspects of this activity, and also for informational services as needed, and for conventional library material. Professors from the University of Puerto Rico involved in this project have had ample and continuous experience in tropical crop production and on problems of the tropics, which is most useful to the soybean program. The grant provides

an avenue by which the development of teaching and training materials can be accelerated and by which new information services can be made readily available. The build up of informational resources can very well benefit from newly established linkages with major international centers in the tropics and with the leading producing countries. Exchanges of information should prove an invaluable asset all around. As in all 211(d) grants, the University of Puerto Rico is expected to provide ready access to its libraries for all who are concerned with this project, not overlooking those personnel from the University of Illinois who are working on the program.

Consulting Services The grant provides means for bringing to Puerto Rico special expertise lacking on the University of Puerto Rico Campus to further enhance its special knowledge and leadership in soybean pathology, entomology, breeding and production management. The visiting lecturers provide leadership in awakening students and staff to the importance of their particular fields of science in agricultural production of soybeans in tropical climates. Consulting services may be requested from, and offered by the University's faculty members in fields related to the topics covered by the grant. Such services are also available to the University of Illinois personnel working on this problem.

The program at this time of reporting is still at an initial stage of execution, thereby offering limited data on established resources. As relating this program to that of another university, and forming linkages with other research centers is in itself a time-consuming task, it is expected that future progress reports will indicate an accelerated pace in the stages that follow.

Land Tenure

UNIVERSITY OF WISCONSIN

Grant Program Director: William C. Thiesenhausen
Director Land Tenure Center
310 King Hall, University of Wisconsin
Madison, Wisconsin 53706

Departments Involved: Land Tenure Center with cooperation of the Departments of Agricultural Economics, Agricultural Journalism, Rural Sociology, History and other social science departments, and School of Law.

The grant is managed at AID/Washington by the Office of Agriculture, Bureau of Technical Assistance.

The Land Tenure Center, established in 1962, is unique in the United States. Its work hypothesis is that in many less developed countries investment in agriculture will significantly increase rural employment and improve income distribution only if preceded or accompanied by basic structural reforms in institutions governing the organization, use and allocation of land.

The Center's research and training programs focus on this type of rural institutional change and its consequences. While most of its work has concentrated on Latin American conditions, it has also become active in studying tenure conditions and opportunities in parts of Asia and Africa. Research conducted by the Land Tenure Center in Latin America over the past nine years is summarized in the book, edited by Peter Droner, *Land Reform in Latin America: Issues and Cases* (Land Economics Monograph No. 3, published by the Center, 1972). Research has usually been carried out at the community level using primary data, thus providing benchmarks for

comparative studies over time and between areas and regions.

The Center's instructional and research programs have drawn upon the ideas and methods of many social science disciplines—most frequently law, political science, economics and agricultural economics, rural sociology, journalism and mass communications, anthropology and geography. Staff of the Center hold appointments in the various departments, but the principal thrust of the Center's work is distinctly multi-disciplinary.

Instructional Resources Aid from the 211(d) grant enables the Center to expand its instructional program with new courses dealing with land tenure problems in less developed countries and through the establishment of an experimental Ph.D. in Development degree program. The latter is an interdisciplinary program for those seeking a career commitment to development problems.

Faculty closely associated with the Land Tenure Center teach more than thirty courses directly applicable to agrarian reform and related institutional development. A fair sampling of these courses include:

- Economic Development of Agriculture
- Law and Modernization in the Developing World
- Economic Problems of Underdeveloped Areas
- Institutional Economics

Sociology of Economic Change
 Land Problems in Latin America
 Latin American Law
 Rural and Urban Migration in Latin America
 Land Tenure and the *Campeſino* in Latin America
 Legal Problems of Economic and Social Changes in Latin America
 Economic Problems of Africa
 African Law
 Theories and Policies Relating to Land Tenure in Africa
 Rural Institutions in Africa
 Land Reform and Economic Development in East & Southeast Asia
 Land Tenure and the Peasant in South Asia.

Special seminars play an important part in the instructional program of the Center. Some twenty-hour long seminars are given in the academic year on such subjects as land tenure in specific regions, law and local development, land reform programs, rural community characteristics, and migration. Seminars are conducted on research by staff and graduate students, by visiting professors from both U.S. and foreign universities, and by distinguished visitors from foreign governments. Occasional all-day conferences present progress reports on research in the field, and some reports are issued in the form of Research Papers. A law and development summer seminar is also conducted.

Staff members of international development agencies and qualified professionals from other countries may enroll in either degree or non-degree programs, and also may participate in seminars and similar activities.

The Land Tenure Center assists qualified students in obtaining financial support from foundations, and encourages overseas AID missions to provide support for appropriate students from the host countries. Occasionally the Center provides backup support for worthy students if other sources are not available.

Research Resources Research capabilities and interest of the Land Tenure Center fall into three general areas. They are:

Area I: Tenure arrangements, systems of property and their broad effects

This area includes issues related to private farms, communal properties, collectives and mixed system, and their social, economic and political effects. Studies are encouraged which examine innovative tenure arrangements (like group farming or production cooperatives) in areas of major agrarian reforms as well as tenure conditions in areas of colonization and new land settlement. Related problems which interact with tenure systems such as land titling, title registration and taxation are included. Studies are needed in many Asian and African countries on the effects of present land tenure systems and associated institutions in furthering or hindering agricultural development. Much of this information is already available on Latin America. In addition, this area includes building a comprehensive body of knowledge dealing with land and water tenure, agrarian structures, and the formal and informal rules, sanctions and enforcement institutions related to agricultural production.

Also encompassed by this area are studies of the legal framework which regulates economic and social activities in the rural sector. This includes describing and evaluating the legal and administrative machinery for planning and carrying through agrarian reform, land settlement, and development schemes. Evaluations of implementation strategies and mechanisms used by existing projects are of special interest.

Area II: Community organization, services, supplies and local controls

This area includes investigation of the nature and extent of change in local organizations,

*Note: These areas and how specific programs fit into them will be referred to in Section B on research.

voluntary associations and public service activities to effectively draw more people into the mainstream of development.

As a result of new technology, further attention needs to be given to the organization and operation of agricultural supply systems for making inputs available to small producers. This includes rules and incentives of service organizations or the role of peasant organizations in reorganizing agriculture in the development nations.

Of particular interest are studies which indicate how local people have been able to organize effectively to plan, finance, build and maintain local infrastructure. Comparative studies which illustrate how agricultural service agencies, local governments, and community enterprises have been created or organized would be helpful.

Additional work is needed in most developing countries to analyze the problems of agricultural research, extension and information programs, marketing organizations, credit institutions, transportation, and local planning and administration. The types of services available to large and small scale producers are not well documented or understood. A study of the relationships among local government, political organizations and the formal law would yield valuable data for development programs.

Area III: Technology, employment and income distribution relationships

A broad range of studies are needed concerning the consequences of modernization, such as the impact of changing technology (like green revolution inputs and mechanization) and related measures of rural modernization on employment creation and income distribution in rural areas. This also includes the attendant problem of the economic, social and political consequences of rapid rural to urban migration and employment shifts.

Changing technology in agriculture frequently results in institutional adjustment but can also create the need for direct intervention to achieve institutional change. The secondary effects of technology also need to

be studied in terms of tenure conditions, market controls, new forms of community influence and the changing structure of training and employment opportunities for young people.

Of particular concern are uneven effects of the new technology in agriculture. A great deal more needs to be learned about how small scale farmers and new settlers can benefit from new crop varieties, mechanization and pest controls, and how they can maintain their relative positions after broad scale technical changes have been introduced.

This area of work will also address a variety of problems concerned with the development of new technology itself and with its dissemination from centers of research to agricultural producers. The creation of institutions for technical study and the design of service delivery systems should be key elements in this study.

Thus, Land Tenure Center research focusses upon rural and agrarian institutional problems investigated within an interdisciplinary framework.

Collaborative arrangements with professional staff in foreign universities on research and training in land tenure, land reform, and agricultural development provide important ingredients to the Center's research program. In Chile the Center works with the Institute for Research and Training in Agrarian Reform and the Institute of Economics. In Africa the University of Wisconsin's College of Agricultural and Life Sciences has been collaborating with the University of Ife in Nigeria for the past seven years. Other Land Tenure Center associates maintain close ties with universities in Ghana and Tanzania. Through an arrangement with the Midwest Universities Consortium (MUCIA), one of the founders of the Land Tenure Center works in collaboration with two Indonesian universities.

Information Resources The Land Tenure Center Library contains more than 30,000 titles. Although over half of the materials deal with Latin America, many recent acquisitions relate to African and

Asian land tenure and development. The collection is particularly rich in government documents, reports, research papers and reprints which are not otherwise readily available. The Library specializes in the collection of materials relating to international agricultural development, agrarian reform, and the social, economic, and political changes associated with rural development.

The Library receives and answers many letters requesting materials or inquiring about the Library's holdings on certain topics, and specialized annotated bibliographies are furnished in numerous cases. Photocopies of articles and uncopyrighted materials can be furnished at the user's expense. Inquiries should be addressed to the Land Tenure Center Library, 432 Steenbock Library, University of Wisconsin at Madison.

The Library also has exchange programs with various U.S., Latin American, African and Asian university libraries. U.S. university libraries with which the Center Library exchanges duplicate materials and offers Center publications in exchange include those of Cornell, Indiana, Michigan, Michigan State, Purdue, Southern Illinois, Tulane and Stanford. Bibliographies and accessions lists are distributed by the Center Library.

A number of specialized bibliographies are published by the Center in its Training and Methods Series. Bibliographies have been prepared on Colonization and Settlement, Sources for Legal and Social Science Research on Latin America: Land Tenure and Agrarian Reform, Mexico, Chile, Colombia, Venezuela, Bolivia, Ecuador, Cuba, Asia, Africa, Peru, and Brazil.

In one recent year alone the Center produced 50 new publications in its different series.

The several series of publications are labelled (a) LTC Reprints (over 110 titles), (b) Training and Methods (23 titles), (c) Research Papers (about 55 titles), and (d) LTC Papers (about 100 titles). A number of publications have also been produced jointly with the Instituto Interamericano de Ciencias Agrícolas in Bogota, Colombia and are available from that source. Several monographs sponsored

with the Land Tenure Center have also been issued by other Latin American agencies and Publishers.

Thirteen films documenting agricultural development in Bolivia, Chile, and Colombia have been produced by the Center, and a catalog description with procedures for rental or purchase will be mailed on request. A new film, "Counterpoint of the Agrarian Reform, 1973," which depicts various aspects of pre- and post-reform conditions is now available in English and Spanish. The Center also issues a Newsletter reporting substantive research results and an informational brochure. A number of the publications noted above are available in Spanish or Portuguese, as well as in English. The center's "available publications list" is issued twice yearly. AID overseas missions receive regular mailings of the Center's publications.

Consulting Services The Center welcomes requests for consulting assistance on tenure related problems ranging from recommendations on taxation to evaluation of a country's agricultural development program. It also assists various agencies in recruiting trained personnel in its general area of competence, and recommends specialists trained through or associated with the Center program. Consultative assignments of Center and allied staff have included the following fields:

- Agrarian reform legislation
- Land reform implementation
- Legal and economic aspects of agrarian reform
- Ownership security of agricultural land
- Technical assistance services for small farmers
- Land settlement programs
- Land tenure
- Land ownership distribution and government assistance
- Land reform program analysis
- Agricultural tax programs

Health and Population Planning

Population planning in relation to public health problems of disadvantaged people, and to the disbalance between mounting population pressures on food supplies and other resources, is a relatively new field of development activity. Because it is new and complex and requires an orchestration of many disciplines, AID has made a substantial investment of 211(d) funds in an interlinked program concentrated in three major institutions. These three—the Johns Hopkins University, and the Universities of Michigan and North Carolina—have established multidisciplinary centers for population studies.

University	Field of Technical Concentration
Johns Hopkins University	Development of auxiliary manpower for the delivery of health and planning services
University of Michigan	Population planning, including demography, reproductive biology, and public policy and programs
University of North Carolina	Population dynamics and family planning

As the cohesive device, the university population center performs a number of important functions: it stimulates closer interdepartmental curriculum planning, provides a central mechanism for responding to the needs of agencies engaged in field operations, and jointly develops new research and consulting enterprises which require participation of a variety of departments. The center is, in short, an innovative means of mobilizing the full span of university resources for coping with major developmental problems which transcend traditional boundaries of single disciplines.

In recent years, AID itself has been devoting more and more attention to demographic pressures in areas where population growth rates are outstripping available resources. Dollar assistance to host country family planning programs began in 1965, and was significantly strengthened in the next year by amendment to the Foreign Assistance Act and by the Food for Peace Act. Principles governing AID's population programs provided that (a) they must be host nation not U.S. programs and must respect host nation sensibilities, (b) assistance is rendered only upon request of the host country in accordance with the type of program chosen by the host nation and its institutions, and (c) support of family planning is not a condition governing

other forms of assistance, and the host country's program must be voluntary as far as individual citizens are concerned.

The importance of this program to many countries is observable in the rapid increase of dollar obligations to population projects. These increased from a level of \$6,000,000 in fiscal 1966 to \$100 million in fiscal 1971.

A basic element of the AID-university partnership in population program assistance was the allocation of some \$3,000,000 to the three universities discussed here to establish "University Overseas Population Fellowships," aimed at bridging the manpower gap from training in academic centers to direct employment in population programs.

AID's population program, which manages the grants described in this section, took on enlarged dimensions in 1972 when it became part of a new Bureau for Population and Humanitarian Assistance.

COMPREHENSIVE PLANNING FOR HEALTH AND FAMILY PLANNING THE JOHNS HOPKINS UNIVERSITY

Grant Program Director: Dr. Carl E. Taylor
Department of International Health
School of Hygiene and Public Health
The Johns Hopkins University
Baltimore, Maryland 21205

Departments Involved Population Center; Department of International Health; Department of Population Dynamics, with collaboration of Departments of Behavioral Sciences, Biostatistics, Public Health Administration, Epidemiology, Pathology, and Medical Care and Hospitals.

The program at the Johns Hopkins University gives priority emphasis to problems of comprehensive planning for health and family planning services and manpower. Because the greatest shortages and unresolved problems of population planning are the issues related to rural problems in developing countries and especially to the role of auxiliary personnel and their preparation, the Department of International Health has developed a special academic emphasis in this area and conducts innovative field studies in several countries. Staff are engaged in many capacities with WHO and UN agencies. One faculty member helped to organize the 16th Triennial Congress of the International Confederation of Midwives has continued to help the ICM's

program for introducing family planning in basic midwifery and nursing curricula in various countries.

The university's Population Center serves primarily as a coordinative mechanism. It is in the School of Hygiene and Public Health and came into being as a result of active collaboration between the Departments of International Health and Population Dynamics. Its principal activity thus far is the management of the Overseas Population Internship Program and the University Services Agreement for population research.

Because of its emphasis on the development of auxiliary manpower for the delivery of health and family planning services, the Johns Hopkins program is especially concerned with village or micro-level field activities and studies. Moreover, a heavy commitment is made to working directly with scientists of less developed countries in the context of their own local conditions.

Instructional Resources The course work available in the gen-

eral field of international and family health is being constantly upgraded as a result of inputs from foreign scholars and overseas studies. The Department of International Health alone offers ten graduate courses plus a special studies program, and interdepartmental collaboration adds substantially to this core.

Two characteristics of the instructional program are worth noting: (a) a very large proportion is in the framework of seminars, thus avoiding "the crystallization of inflexible patterns of teaching"; and (b) an emphasis on personal tutorial relationships between faculty and graduate students.

One innovation in instruction is a special program in comprehensive planning. It includes a Program for International Health Planners which is designed primarily for senior health officers of international agencies and institutions. This program has been instrumental in the parallel development of one of the first health planning courses for U.S. planners. The staff is involved in developing the core curriculum concept as a format for the Masters of Public Health program so as to expose candidates to major currents of concern and action. Important to the program's educational philosophy is an open and enquiring perspective on attitudinal change as part of the development process. The program "is increasingly concerned with the social dimensions of development and the need to measure 'quality of life' variables which go far beyond economics."

The list of basic courses in the international health program include the following:

- Introduction to International Health
- Seminar for Program Planning and Project Development in International Health.
- Quantitative Decision Procedures (with Biostatistics)
- Planned Change (with Behavioral Sciences)
- Comprehensive Health Planning (with Public Health Administration)
- Techniques and Interpretation of Epidemiologic Field Studies of Infectious Diseases

- Population Growth Interrelations, Problems and Policies (with Population Dynamics)

- International Health Area and Language Study

- Teaching of Community Medicine in Medical School

- Economics of Health

- Special Studies (individual student projects).

In the past year, seven students were enrolled in the Department of International Health's Residency Program, three in the Doctoral Program, thirty-one in the MPH program, and fourteen were awarded Senior Health Planner Certificates. Two students were undertaking Special Studies in International Health.

Courses given by the Department of Population Dynamics are as follow:

- Introduction to Population Dynamics

- Introduction to Physiology and Methods of Fertility Control

- Population Growth, Interrelationships, Problems and Policies

- Public Health Statistics

- Introduction to Demographic Method

- Family Planning Administration

- Biology of Reproduction

- Population Studies

- Techniques of Estimation

- Stochastic Models for Birth, Death, and Illness Processes

- Economics of Population and its Planning

- Research Seminar in Population Dynamics

- Special Studies and Research

In the past year the Department of Population Dynamics had the following numbers of students enrolled in their various programs: eight in the D.Sc. program, five in M.Sc., two in Ph.D., seven in Dr. P.H., ten in post-doctoral programs, fourteen in MPH, and twelve students were in special student classifications.

An important component of the instructional resources is an expanding "video-tape

bank for modules of self-learning" in the field of international health and population problems. The system includes realistic records of needs and activities of some of the university-related overseas programs.

The number of doctoral candidates is necessarily limited by the heavy requirements of faculty time to provide supervision for overseas field activities. Dissertation research of recent doctoral candidates covers a wide spectrum of subject matter including such topics as national health planning in Ethiopia, the family planning impact of a health nurse project in Nigeria, a prediction model of family planning acceptance in rural India, nutrition and infection in India, social psychological correlates of fertility behavior in India, problems of early child nutrition in various areas, studies of manpower and related administrative dimensions of family planning programs, and data requirements for comprehensive health planning.

A flexible number of fellowships are provided from PHEC grant funds and from the Ford Foundation. U.S. scholars may receive support from HIW fellowships and traineeships, and in special cases other university fellowships are also available. Special facilities are available for most foreign students.

Emphasis is given to student participation in program and curriculum planning, and a joint student-faculty committee stimulates interchange in the Department of International Health. A series of seminars on Great Issues in Health Care, with problems chosen by a student-faculty committee, is also an interdepartmental and multidisciplinary part of the Master of Public Health instructional format.

Research Resources—Research activities of the Johns Hopkins program are focussed primarily around certain critical themes rather than specific geographic settings. These interests have been defined as follows:

1. The integration of health and family planning services at the local level.

2. Basic motivations for continuing family planning utilization, especially among rural people.
3. The development of innovative planning and evaluation methodology for health and family planning services.
4. The functions of the health team and role definitions of each member.
5. The adaptation of educational preparation to more clearly defined occupational roles and the development of new educational methods for mass production of high quality auxiliaries.
6. The development of a community orientation for health professionals, especially through the use of field training areas.
7. The epidemiology of the weaning syndrome of synergistic malnutrition and common infections.
8. The sequelae in growth and development, both physical and mental, from poor nutrition and illness in early life and the development of better weaning supplements.
9. Epidemiology of diseases of poor populations, especially in tropical areas.
10. Interactions between health and economic development.

The organization of research activities has developed in two patterns. One is the pattern of developing research bases overseas in which the Johns Hopkins program can carry out field projects with its own teams as in the Narangwal Rural Health Research Center in India. The other pattern relies on teams of local scientists in collaborating institutions overseas to carry out the actual field work. Specific research activities are currently as follows:

1. Functional analysis of local health needs and services; a methodology for local planning, with field studies in India and Turkey.
2. Interrelationships between health and economic development, including literature search and bibliography, consultations with World Bank and AID

- specialists, data collection in Brazil and possibly Indonesia and Taiwan.
3. The Narangwal (India) population study, including baseline surveys testing the development of health and family planning services and eventually socio-metric studies of the interaction between family health workers and village people.
 4. The Narangwal nutrition and infections study, including data collection, introduction of family planning activities, and planning for village panchayats to assume responsibilities for food and nutrition programs.
 5. Epidemiological studies of leprosy in Calcutta and Purulia (India), a study of nine villages in West Bengal which includes experimentation with a skin test antigen.
 6. Study of the role of indigenous practitioners in the traditional health cultures of India, and their role in the state family planning program in Kerala.
 7. Study of the factors associated with the decline in the Punjab birthrate in India, and a related study of the success of the "green revolution" there.
 8. Nutrition and health care in Peru, including development of a comprehensive health care scheme in a slum area, assessment of the role of volunteers and community organization, prevention and treatment of malnutrition, and studies of lactose "intolerance."
 9. The Gbaja (Nigeria) family nurse project, including pilot training programs and work with a contraception clinic.
 10. Preparation of a model of health sector services based on a national health manpower study in Chile, a medical care study of three large regional hospitals in that country, and projects in family planning.
 11. Health manpower research in Taiwan and Thailand.
 12. Advisory services on the organization

and curriculum of the University of Teheran Faculty of Medicine (Iran)

13. Geographical epidemiology studies in Chad and Afghanistan
14. Development of a data bank system useful to both teaching and research programs

In addition to these specifically overseas research programs, studies are also in progress on various factors relating to reproductive biology, demography, contraceptive acceptance and effectiveness, and domestic family planning programs.

A number of doctoral candidates undertake their thesis research overseas through institutional relationships established abroad by the Department of International Health. There are also approved residencies in international health which are directed either toward service activities or toward research, and usually run for about two years.

Collaborative research and service arrangements with I.D.C. institutions are welcomed. Efforts are made to maintain overseas relationships in each of the major geographic areas.

Information Resources. The Department of International Health maintains an international health collection of approximately 1,500 volumes composed of journals, books, reports and documents which are supplemented by data obtained abroad, and a population library of about 4,000 volumes. These resources are being reevaluated and updated, with plans for installation of analytical computerized data storage and retrieval. The specialized libraries are tied in with the noted Welch Library of the Johns Hopkins Medical Institutions which in turn is tied in with the National Library of Medicine.

A multidisciplinary "International Journal of Health Services, Planning, Administration and Evaluation" is jointly sponsored by the Department of International Health and the Department of Medical Care and Hospitals. (Subscription is \$20 per year for countries with a per capita GNP of more than \$500.

and \$12 per year for countries with lower per capita GNP rates.)

Abstracts and offprints of numerous research studies and papers are available. The current annual report of the grant program at The Johns Hopkins University lists 42 such articles and reports issued since the beginning of 1970.

A Johns Hopkins Monograph Series has recently been initiated. The first six titles of the published monographs are as follows:

- Health and Disease in Chad
- Health and Disease in Four Peruvian Villages
- Health Manpower in Peru
- The Health Center Doctor in India
- Health Manpower Planning in Turkey
- Health Manpower in a Developing Economy.

A descriptive folder is available from the Johns Hopkins Press, Baltimore, Maryland 21218, on the monograph series and books of related interest. Descriptive folders are also available on The Department of International Health and on the Comprehensive Health Planning program and on its "Global Approach".

Consulting Services—The Johns Hopkins program provides a broad network of consulting services in health and family planning. This includes a variety of U.S. and International agency relationships, cooperation with other U.S. and foreign universities, and extensive participation in AID-sponsored research and development overseas. The specialized consulting service available from the departments involved in the Population Center generally follow the specialties already indicated.

POPULATION PLANNING, TEACHING, RESEARCH UNIVERSITY OF MICHIGAN

Grant Program Director—Dr. Inehendu B. Kar (Acting)
Department of Population Planning
School of Public Health
University of Michigan
Ann Arbor, Michigan 48104

Departments Involved—Department and Center of Population Planning, School of Public Health, Populations Studies Center, Center for Research on Reproductive Biology.

The University of Michigan's Center for Population Planning was established in 1965 for teaching, research and service in what was then considered a new field of academic endeavor. It was necessarily an interdisciplinary effort involving inputs from several departments. By the Fall of 1971, the Center had evolved into the Department of Population Planning in the School of Public Health.

The Center will continue as a unit of the Department to facilitate certain intra-

university research and service functions. With its sister centers in the University Population Program—the Center for Research in Reproductive Biology and the Population Studies Center—it helps to mobilize relevant resources of the University for activities at home and abroad.

The combined Department and Center now include a senior teaching faculty of seven, fourteen research associates from different disciplines, five non-resident lecturers, and a number of research and administrative staff.

Instructional Resources—The University maintains three specialized degree programs with emphasis on population planning: a Master of Public

Health, a Master of Science, and a Ph.D. in Public Health. The specialized sequences in Public Health are intended to prepare students for careers in population planning, either within public or private operating agencies or in universities and research institutes. They include basic courses in public health, statistics, and population planning (demography, reproductive biology, public policy and programs) and permit individualized specialization. The (MS) program is designed for students who already have master's degrees in other fields but who wish greater specialization in population planning, and for students without prior graduate preparation who are interested in academic or research careers.

In addition to the doctoral program in Public Health, an interdepartmental Ph.D. in population planning is also offered for those who wish to pursue a broader spectrum of population studies in relation to other disciplines. In addition to the doctoral program in Public Health, an interdepartmental Ph.D. in population planning is also offered for those who wish to pursue a broader spectrum of population studies in relation to other disciplines.

In a recent year nine University of Michigan graduate students were engaged in the Ph.D. program in population planning, thirty in Master's programs, five in special studies programs, and thirteen in summer session studies.

Courses in population planning at the graduate level normally include the following or their equivalents.

Foundations in Population Planning
 Population Programs
 Human Reproductive Biology
 Pro-seminar in Population Planning
 Population and Human Affairs
 Topics in Population Planning: e.g., Social Psychology of Fertility in a Changing Peasant Society
 Field Experience in Population Planning
 Advanced Seminar in Population Planning
 Readings in Population Planning
 Research in Population Planning

Administrative Factors in Population Planning Programs
 Education and Communications in Population Planning
 Methods of Research and Evaluation in Population Planning

The M.P.H. candidate is expected to "major" in one of three areas: (a) planning and administration, (b) education and communications, and (c) evaluation and research. A wide variety of electives in these three major areas is offered in a number of different departments. Arrangements may also be made by qualified students to plan programs of study which integrate population planning with other programs such as biostatistics, epidemiology, health education, maternal and child care, or public health nursing.

Individual non-degree programs of study can be arranged to meet the needs of a limited number of special advanced students, usually from operational programs at home or abroad. Short-term courses for special groups interested in population programs can also be arranged on request, and members of the Center staff also participate in special training programs of various agencies in the United States and abroad.

Specialized graduate study programs in population are available also in the Departments of Sociology and Economics and one is being developed in the Department of Geography. Examples of population courses in other departments include

Demographic Approaches in Anthropology
 Demographic Methods in Public Health (Biostatistics)
 Economics of Population Growth
 Spatial Models in Population Planning (Geography)
 Population Genetics (Human Genetics)
 Research Methods in Population (Sociology)
 Advanced Population Studies (Sociology)
 Mathematical Population Models (Sociology).

The Department of Population Planning awards a limited number of fellowships to qualified graduate students preparing for careers in population planning. Center Fellowships made possible by grants from AID, the Ford Foundation, and the Public Health Service cover tuition and academic fees, living allowances and limited travel expenses. Fellowship funds are also available from other sources. Inquiries should be addressed to the Chairman, Department of Population Planning.

To assist students from other countries, the University conducts an International Center to assist in orientation and to supply non-academic counseling services.

Research Resources Current research activities of the Center reflect a mixture of individual faculty interests and of the problems and opportunities presented to groups of faculty participating in the Center's "field partnerships" (in various countries overseas and in Michigan). Each field and research project deals with some aspect of new knowledge about organized efforts to achieve optimal balance between human reproduction and quality of life. Particular interest and capabilities of the Department include demography, economics of population growth; education, psychology and social work aspects of population planning; survey research, and special geographic areas considerations.

Overseas research has involved assignments in India, Malaysia, and the Philippines.

The Center has maintained several long-term "partnerships" in the research aspects of population planning programs. The first and longest of these was established in Michigan in 1965 with the agencies responsible for family planning programs at state and local levels (primarily metropolitan Detroit and Ann Arbor). "Partnerships" with other countries maintained at one time or another include those with Malaysia, Nepal, India, Taiwan, and Togo.

More general long-term studies are in progress relating to the response of the United

Nations system and multilateral agencies to the population problem and population planning assistance, and of the political implications of demographic change. The results of the latter investigation have appeared in book form.

Information Resources Both the General and Graduate Libraries of the University maintain interlibrary loan facilities. Although the Reference Collection of the Center for Population Planning has no formal interlibrary loan plan, it occasionally makes materials available on a cost basis (5 ¢ per xerox page). The Center maintains working relationships with other members of the Association of Population Libraries and Information Centers. There is no joint catalog, but acquisition lists are exchanged.

The Center's Reference Collection includes about 1,500 titles and subscribes to more than fifty journals and nearly as many newsletters. It cooperates with similar population libraries around the world by exchanging monthly acquisition lists. An annotated bibliography on induced abortion has been published, and additional publication plans are under development. In process is the development of a staff reprint service to distribute xerox copies of staff publications to interested institutions around the world. Thereafter a project is planned to acquire, index, store, and distribute microfiche copies of significant family planning reports, articles and other publications.

A list of publications prepared by Center and Department staff is included in the Center's annual reports and may be obtained from the Center.

Consulting Services Members of the staff carry out a wide variety of consulting assignments through AID and with foreign government agencies and overseas institutions as well as with numerous U.S. agencies. Overseas consulting assignments have generally been indicated under the subsection of "Research Resources".

The particular fields of professional consultation competence represented by experienced members of the staff include:

Population program development and administration
Commercial distribution of contraceptives

Education for population planning
Evaluation of population programs
Political implications of population programs and changes
Rural family planning program development and use of midwives
Training of auxiliary personnel

POPULATION DYNAMICS & FAMILY PLANNING UNIVERSITY OF NORTH CAROLINA

Grant Program Director: Dr. Moye W. Freymann
Carolina Population Center
University of North Carolina
Chapel Hill, North Carolina 27514

Departments Involved: The Carolina Population Center represents a variety of disciplines and departmental interests as in Anthropology, Sociology, Political Science, Biostatistics, Maternal and Child Health, and Health Administration.

The Carolina Population Center supports and coordinates a comprehensive program of research, education and service in the field of population dynamics and family planning, both domestically and overseas. Its program also involves resources from nearby Duke University, from the North Carolina State University at Raleigh, and from the Research Triangle Institute. The Population Center at Chapel Hill maintains a network of service relationships with a number of international agencies and with institutions and government agencies in less developed countries.

Represented on the Center's staff are various disciplines ranging from basic biomedical and demographic research to aspects of population program and policy development. The Center's International Programs Office coordinates relationships abroad, aided by Area Study Groups concerned with different countries. A state Services Office coordinates field work in the United States. The Center's Academic Programs Office helps to build basic teaching and research program on campuses of the State University.

Faculty associates of the Center hold their academic appointments in the various departments of the University. They participate not only in teaching and research, but also in problem-oriented working groups concerned with various aspects of the total program. Two deputies, one for the teaching, research and services program, and the other for administration, assist the director of the Center. Under the direction of the Dean of the School of Education, a permanent program in Population and Environmental Education is maintained as an extra dimension of the Center's concerns.

Instructional Resources: Special postgraduate course sequences have been developed at the University of North Carolina for the preparation of administrators, teachers, and researchers in population studies and family planning, with special emphasis on problems of less developed countries. In a recent year graduate students concentrating on population studies numbered 126, about half of them from less developed countries. Approximately half of the graduate student body specializing in population studies are primarily concerned with population research and analysis, while the other half concentrates on aspects of family planning program development.

Graduate students register in a standard departmental discipline with the objective of acquiring greater depth in the application of that discipline to the population field. Those primarily concerned with population research and analysis may be registered in the department of Anthropology, Biostatistics, Ecology, Economics, Epidemiology, Geography, Political Science, Psychology, Reproductive Biology, or Sociology. Those who are more concerned with implementation of population programs and policies may enroll in Health Administration, Health Education, Maternal and Child Health, Obstetrics and Gynecology, Social Work, or in the School of Education.

Over 40 courses are offered by the participating departments on various aspects of population and family planning. The Center's Training Office assists each student in curriculum planning in accordance with his special interest and needs.

Special seminars are organized weekly through the year for all advanced population students and concerned faculty, to consider broad issues and special problems of population studies.

Students are involved in special population research and service projects in the southeastern United States on problems related to those encountered in developing countries, and some students also receive research assignments to collaborating institutions abroad.

Several conferences have become annualized at Chapel Hill, including an international conference on population statistics and laboratory programs in developing countries which involves participants from Asia, Africa and Latin America; an annual workshop on political science research in the population field; and an annual workshop on population library and reference methods involving participants from international agencies and overseas institutions.

Observation and study programs of a short-term character are arranged by the Center for individuals and small groups according to their interests and needs, ranging from periods of a day to several months. Generally more than 150 persons are involved in such programs annually, of which about half are

from population-related agencies in the U.S. and about half from less developed countries sent by AID, United Nations agencies, and foundations. More formal short courses are also arranged and held abroad for faculty groups, and, for family planning communications specialists and administrators from developing countries.

Limited fellowship assistance is available to both U.S. and foreign students for post-graduate studies in population research and family planning program development. Such students must qualify for University departmental admission. Fellowships usually cover basic tuition and study expenses plus living costs. More specific information may be obtained from the Population Center's Training Office. A general orientation program is provided for foreign students, and those with borderline language proficiency are enrolled in a special English course. Foreign students are also assisted by the International Student Center.

Research Resources Population research at Chapel Hill aims to mobilize and focus the insights from many disciplines to build a broader and deeper basis for population policy and program development. The principal areas of research concern at the Center may be listed as follows:

- Demographic statistics, and improved methods for population data collection and analysis
- Biomedical research, aiming at finding clues to better birth control methods and developing a worldwide network of studies to test promising methods
- Population dynamics studies and factors underlying population change under various conditions
- Population policy studies to clarify goals and interrelate other relevant factors
- Family planning program operations studies to improve planning, implementation and evaluation
- Population education studies to mobilize educational systems and resources for action programs.

International research by faculty and students is fostered by several collaborative programs of study with colleagues in Asia, Africa, and Latin America. These include an international fertility research program dealing especially with testing and demonstrating new birth control methods; an international program of population statistics field studies; a series of reproductive epidemiology studies in cooperation with the World Health Organization; an international consortium for population policy studies, and a program of studies in population program and policy design.

Student research abroad is encouraged through various means. Examples of projects include studies on family structure and family planning in Thailand, studies of age of marriage in India, fertility change in Egypt, and population policy in Peru.

Through the AID-sponsored program of overseas population internships, graduates may be assigned to relevant institutions and agencies in other countries. In recent year graduates from North Carolina and other universities were placed as interns in Iran, the Philippines, Thailand, Kenya, Nigeria, Costa Rica, Malasia, Taiwan, Morocco and Yugoslavia. For additional information on internship opportunities, inquiries should be addressed to the Center's International Programs Office.

The Center's involvement in international collaborative research programs has involved arrangements with institutions and agencies in some 20 countries.

Relevant research facilities at Chapel Hill include basic reproduction biology laboratories and clinical research facilities. Computer facilities for demographic studies are also available, and the Center's Demographic Research and Services Unit provides consultation on population research design and analysis and helps with data processing and cartographic services. A unique resource exists in the area for population field research and teaching "laboratory" situations in portions of North Carolina where problems and conditions are relatively similar to those of many developing countries.

Information Resources The Library of the Carolina Population Center includes more than 10,000 items (books, reprints, and other materials), and it subscribes to more than 200 population-related journals. Special geographic area collections exist on Korea, Taiwan, Thailand, Pakistan, India, Iran, Egypt, and African countries, and for the southeastern United States.

Direct requests for population reference assistance by persons or agencies from outside the campus are processed within existing staff capacity. Such services have included general reference and bibliographic help, provision of reference copies, and referrals to specialized collections elsewhere. Inquiries should be addressed to the Librarian, Carolina Population Center.

The Center's Publications Office has in the past few years produced 29 monographs, papers and books. The Center also supplies reprints of selected articles by the faculty appearing in professional journals; thirty-six titles are currently available. Lists of these publications may be obtained from the Center's Publications Office. The Center's Library also produces, as a service for researchers, a periodic scanning list of population-related articles from current journals. Moreover, extensive bibliographies on over twenty-five population and family planning subject areas have been prepared, as have U.S. and international directories of population information and reference services. The Center also issues a general newsletter.

The Carolina library group has pioneered efforts to improve population research cataloging, classification, processing and reference methods, and provides training and direct consultation to new population libraries and librarians. Under an AID-sponsored project it is engaged in a major pilot effort to develop an automated system of storage and retrieval for population and related literature.

The Center's Educational Materials Unit produces teaching aids for training and public education uses and maintains a worldwide clearinghouse service for such materials.

Consultation Services Consultative and advisory services are being provided to and through a number of bilateral, domestic and international agencies: in AID to the Technical Assistance Bureau, regional bureaus, and country missions; in the United Nations system to the Population and the Science and Technology Divisions, the UN Fund for Population Activities, and WHO, UNESCO, IBRD, ECAFE; and to the Pan American Health Organization as well as to the International Planned Parenthood Federation. In the United States consultative services are rendered to the U.S. Department of Health, Education and Welfare, the Office of

Economic Opportunity, and to states, local governments and private groups in the Southeastern U.S.

Altogether more than a hundred professional staff are associated with the Carolina Population Center program, and most of them are available for contractual consultation on an individual or team arrangement for well-defined and relevant tasks and with sufficient advance notice. Inter-institutional collaboration can be arranged as needed to provide additional depth. Inquiries should be directed to the Director of the Carolina Population Center.

Nutrition

The Massachusetts Institute of Technology has a long and impressive record in nutrition studies and in developmental concerns. This five year grant will serve as a vehicle to integrate and deepen that institution's involvement. MIT envisions the following products of grant activities: (a) a strengthened research capability to determine the relative value of alternative program approaches to alleviate malnutrition; (b) a data base and generalized body of information useful for planning national nutrition programs; (c) a graduate level educational and training program suitable for personnel aspiring to become engaged in multisectoral planning in developing countries; (d) a capacity to provide advisory services to governments and to multilateral and bilateral assistance agencies on specific aspects of nutrition planning and programming; (e) a network of worldwide institution linkages. The grant is managed in AID/Washington, by the Office of Nutrition, Bureau for Technical Assistance.

NUTRITION

Massachusetts Institute of Technology

Grant Program Director: Dr. F. James Levinson
International Nutrition Planning Program
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Departments Involved: International Nutrition Planning Program, Center for International Studies, Department of Nutrition and Food Science, other social science departments of the Institute.

This new 211(d) grant will finance a five year program to strengthen and expand the capability of the Massachusetts Institute of Technology to infuse nutrition planning into multisectoral planning methods, teaching activities and technical assistance efforts in low income countries.

This grant will serve as a vehicle to integrate two areas of interest, "nutrition and development studies." An existing 211(d)

grant in science and technology to M.I.T. concentrates on the transfer of technology to developing countries, and will provide advice on technology alternatives appropriate to nutrition program planning, assuring coordination between the two programs.

The Massachusetts Institute of Technology has long been actively concerned with development problems of low income countries. The Center for International Studies has been involved in development activities in numerous countries including India and Chile. The Department of Nutrition and Food Science has done important work in the assessment of nutrition problems and on several technological alternatives. Faculties in the Sloan School

of Management and the Departments of Economics, Political Science, Mechanical Engineering and Ocean Engineering have been involved in various facets of development.

More than two years ago the first international conference bringing together the disciplines concerned with nutrition and national planning was held at M.I.T. This seminar demonstrated the need for improved nutrition planning techniques to facilitate the implementation of nutrition programs into broader strategies of economic growth.

Given these needs and the strong background and commitment of M.I.T., the International Nutrition Planning (INP) Program was established in 1972 by the Department of Nutrition and Food Science and the Center for International Studies, with financial support provided by the Rockefeller Foundation. The INP Program has been able to initiate a range of activities pooling experience and competence from various parts of the Institute and from other universities.

Instructional Resources Success in program planning and implementation will depend in part on the existence of personnel with training and experience relevant to malnutrition problem solving in low income areas. In addition to the development of such a trained cadre of professionals, there is need to provide planners with an understanding of malnutrition and the dynamics of nutrition intervention, and to acquaint nutrition and health personnel with planning tools and with the relationship of nutrition to the broader process of economic growth. Given these needs in international nutrition, M.I.T. is offering the following programs of graduate study and training:

a) Graduate Study. The graduate study program is designed to help produce a cadre of well trained professionals with skills appropriate for nutrition planning undertakings. M.I.T. will offer disciplinary training to provide solid grounding in a particular field (e.g., nutritional science, economics or political science) coupled with a broad exposure to subject matter in other relevant disciplines

and a common middle ground of nutrition planning talents and experience. The selection of this approach is based on the belief that individuals thus prepared will be able to contribute, in the context of a multidisciplinary unit or team, most effectively, given the highly complex nature of the problem.

Between six and ten graduate students are expected to be affiliated with the program by 1975 and between twelve and twenty by 1979. M.I.T. has had a record over the years of attracting foreign students, a large proportion of which come from low income countries. The INP program expects to follow in this tradition and anticipates that between a quarter and a third of its graduate students will come from these countries.

b) Advanced Study Program. The INP Program in collaboration with the M.I.T. Center for Advanced Engineering Study expects to initiate in September, 1974 a special nine month Advanced Study Program for Fellows in International Nutritional Planning. The Advanced Study Program is designed primarily for officials of governments and international agencies who are involved in or are likely to become involved in the planning, implementation, or evaluation of programs designed to combat malnutrition in low income countries. It is intended to provide orientation in multisectoral nutrition planning and an understanding of the dynamics and tools of nutrition intervention.

A small number of persons will be accepted each year as Fellows for this non-degree program. Each person accepted will undertake a special program of course work, seminars, and in some cases field work, developed in a way which most sensibly supplements existing talents and experience, whether in public health, finance and economics, or administration. Among relevant subjects are development economics, human nutrition, quantitative methods and data analysis, health service administration, and region-oriented political development.

c) Short-term Workshops. While the graduate degree programs and the Advanced

Study Programs are aimed at the development of nutrition planning professionals, there is a concomitant need for shorter term efforts aimed at officials with more specific needs. The program will seek to determine the most effective means of operating such programs through systematic exploration of alternative approaches. Each program will focus specifically on a particular geographic area or subject matter area addressing the needs of a particular group of program planners.

In an area-specific training program on nutrition intervention, for example, staff and trainees together would examine the extent and implications of malnutrition in that area, its relationship to the larger development process, the determinants of malnutrition, and the techniques of determining optimum strategies. Regional specialists on rural development, demography, anthropology and food technology then would be called upon to help identify the relationships of these subject matter areas to malnutrition in the country or region being addressed. To the extent possible, individuals in the program will be involved directly, for as long as one month, in M.I.T.'s operational field functions. These field experiences will be utilized as case studies for use in future training.

Research Resources During its first two years, the INP Program devoted considerable attention to the identification of nutrition research priorities. In addition to these deliberations, the Program participated actively in the Meeting on Nutrition Policy and Programming Research organized and sponsored by the World Bank and the Agricultural Development Council. That meeting identified a series of policy-oriented nutrition research priorities (which are highly consistent with those of the INP Program).

The research needs presently accorded highest priority by the INP Program are:

- (1) Studies to increase understanding of the causality and dynamics of malnutrition among vulnerable population groups for the purpose of identifying appropriate intervention points.

- (2) Studies to determine the relative value of alternative nutrition program approaches or delivery systems utilizing cost-effectiveness analysis.

The INP Program has been addressing the former through a "multidisciplinary research group" of ten faculty members and students representing the fields of economics, political science, nutrition, medicine, anthropology, psychology, agri-business and administration. A general model of malnutrition causality has been developed to serve as the basis for a detailed field application in a low income country.

The program has been addressing the second need through a joint project with Howard University under contract with USDA (AID supported) on the assessment of alternative interventions. During 1973, the M.I.T.-Harvard team designed a methodology for the evaluation of alternative approaches including an adaptive cost effectiveness design. Subsequently the group, with active inputs from graduate students, has been collecting and organizing existing information on the costs, effectiveness, coverage and conditions of nutrition programs in each of several categories which have been undertaken in the past. Other priority research studies of major interest to the INP Program include:

- 1) Practical means of determining and monitoring the nutritional status of populations
- 2) Empirical determination of nutrition program benefits
- 3) Determination of the effects of income and price changes on the nutritional intake of vulnerable populations
- 4) Determination of operational relationships among nutrition, population, maternal health and sanitation.
- 5) Study of food policies of food exporting nations as these relate to international food needs

Multidisciplinary planning studies. One means of approaching these research needs relates to a major INP Program responsibility,

namely, the product of detailed multidisciplinary planning efforts carried out in concert with local planning personnel. In collaboration with AID and other international assistance agencies, the INP Program has been involved in nutrition planning activities in several countries, among them Indonesia and El Salvador. The Program envisages longer term involvement in a systematic, phased program of nutrition planning in Pakistan. This input, financed by AID contract would be designed to facilitate activities of the Nutrition Syndicate located in the Pakistan Planning Commission.

Development of a data base and generalized body of information. Through such studies, M.I.T. will develop a considerable body of information and expertise, some of which could be generalized to larger geographic areas. After several studies have carried out, both the procedures developed and the data generated should considerably facilitate and expedite similar studies elsewhere.

Information Resources M.I.T. intends to make a systematic effort to collect relevant information on related pursuits in other parts of the world, and to utilize their results as well in determining effective approaches. This information collection system will be a built-in corollary of all research activities and in the future might serve as a basis for a dissemination system for domestic and international use.

The INP Program has been laying the groundwork for an International Malnutrition Map. Such a map, comparable to agricultural and population yearbooks, would provide country-specific data on malnutrition and its correlates as well as program information. The information is being organized on a country-by-country basis as well as on a subject-matter basis, the latter permitting spectra of such variables as nutritional status, morbidity, breast feeding practices, income distribution and nutrition program expenditures, indicating the relative position of each country.

The M.I.T. International Nutrition Planning Program and the Cornell University Program

in International Nutrition and Development Policy are jointly initiating the Cornell-M.I.T. International Nutrition Policy Series, a case studies monograph series in international nutrition. This continuing series will focus on two main categories of monographs: 1) national or regional planning studies, utilizing tools of the natural and social sciences to identify and refine appropriate nutrition policy instruments; and 2) reports and reviews of specific nutrition intervention programs, providing accounts of actual projects, information on projected costs and effectiveness, and evaluation of the impact and significance of such programs. Such a series will permit the broad distribution of information on nutrition planning efforts and on actual intervention programs. Volume 1 of the *Cornell-M.I.T. International Policy Series* is entitled "Morinda: An Economic Analysis of Malnutrition Among Young Children in Rural India" by F. James Levinson. It is anticipated that two monographs will be published each year.

In addition, M.I.T. publishes a Technical Report Series pertaining primarily to its own field research. The first of these was a study of high protein product development efforts in Thailand based upon an AID-financed study in 1973. The second will relate to program development in Indonesia.

Consulting Services It has become evident that while recognition of the implications of malnutrition is increasing among governments of low income countries and among international agencies, these entities sometimes lack the personnel to translate this concern into effective programs. The INP Program will provide to these governments and agencies a pool of skilled persons capable of providing competent operational advice geared to the solution of malnutrition problems. Such advisory services would be available in the broad area of nutrition planning. It also would be provided to aid in the solution of such specific elements of a nutrition strategy as (1) particular deficiencies among population sub-groups; (2) the design or evaluation of supplemental feeding, food

fortification; plant breeding, or information disseminating programs; (3) utilization of nutrition inputs as a means of strengthening health, family planning, or educational institutions; and (4) the nutrition implications of an agricultural price policy or production-incentive program.

A significant amount of advisory services

has already been provided by the INP Program. These services were undertaken by M.I.T. faculty and staff supplemented by individuals from other institutions. Efforts have been made to involve M.I.T. students in these valuable field experiences. Agencies involved in the program's advisory services have included AID, UNICEF, WHO and the Ford Foundation.

Law, Development And Modernization

Law and legal institutions may play a significant role in development and social change. Until very recent years, however, there has been little systematic study of the relationship of law and development with specific regard for developing countries.

The 211(d) grants for two American law schools—Stanford and Yale—are enabling them to work on this subject.

Stanford is focussing its attention on countries within Mediterranean Europe and Latin America, which share the civil law tradition. Yale's specific geographic interests have been in Brazil and Africa, although it also gives attention to South Asia. Both programs call for close collaboration between the law schools and other branches of the universities to which they belong, as well as collaboration among universities and scholars in the U.S., other developed countries, and the LDCs.

The Stanford grant program is managed at AID Washington by the Office of Population and Civic Development, Bureau for Latin America; the Yale program by the Civic Participation Division, Office of Policy Development and Analysis in the Bureau for Program and Policy Coordination.

University	Field of Technical Concentration
Stanford University	Interplay between legal and other social processes
Yale University	Sociology of the legal profession applicable to current policy planning.

RELATIONSHIP BETWEEN LAW AND DEVELOPMENT STANFORD LAW SCHOOL

Grant Program Director: Dr. John Henry Merryman
Stanford Law School
Stanford, California 94305

Departments Involved: the Stanford Law School, with cooperation of the Department of Political Science, the Center for Latin American Studies, the Center for Research in International Studies, the

Stanford International Development Education Center, the Center for Research in Economic Growth, the Graduate School of Business and the Food Research Institute.

Although centered in the Law School, the 211(d) grant program in "Law and Development" at Leland Stanford Junior University draws also upon the scholarly resources of a number of University departments and "centers". The components of the programs are outlined as follows:

1. The training of U.S. law students and young legal scholars from Latin America in law and development through the Law School's instructional program and through work-study assignments in Latin America.
2. A major research effort in law and development involving Law School faculty members, scholars from other disciplines, foreign legal scholars and U.S. law students.
3. Development of a comprehensive library of materials on law and development, with special attention to Latin American laws and legal institutions.
4. Sponsorship of workshops on law and development to enable scholars of various disciplines, U.S. and foreign, to share their knowledge of the field.
5. Establishment of a limited number of cooperative relationships with law faculties and other legal institutions in Latin America, both to advance the research interests of the program and to insure its relevance to the development needs of legal systems in specific countries.

Instructional Resources Various courses, both within the Law School and in other departments of the University, orient the advanced student to interrelationships between a society's legal system and its more global social system. Law School offerings relevant to Latin America and Mediterranean Europe, for example, include Comparative Constitutional Adjudication, Legal Systems of Western Europe and Latin America, Anthropology of Law, Law and Social Science, Methodology in Social Science, and International Law and Institutions. The major research program described

below will also yield teaching materials for a new course in law and development. In other departments of the University, moreover, a substantial number of courses provide valuable background for the theoretical and empirical study of law and development.

Fellowships are available to particularly qualified graduate students and more senior scholars in three categories: (a) Scholars in Residence; (b) Graduate Law Fellows; and (c) Work-Study Fellows. Scholars in Residence are nationals from Latin America or Mediterranean Europe usually selected from candidates who are university professors or high government personnel. Their stay in Stanford averages six months during which time they contribute to research on law and development as well as work on new teaching materials. Graduate Law Fellows must be admitted for candidacy in an advanced law degree program. They write a thesis related to law and development and may take selected course work. Recent U.S. law school graduates may also qualify as Work-Study Fellows in Latin America. They are normally placed in cooperating law schools or other legal institutions in Latin America for two years. Work-Study Fellows undertake specific research projects on critical legal problems related to the development of their host nation.

Research Resources The major research effort under this grant consists of parallel field studies in law and development now being conducted in six countries: Chile, Costa Rica, Italy, Mexico, Peru and Spain. The research design was formulated jointly by Stanford Law School faculty members and a group of development scholars from the above mentioned six nations who were brought to Stanford as Scholars in Residence during 1972. These scholars are now conducting empirical studies in their respective countries. These studies will draw both upon comparative data on the general relationships between legal and social change, and upon specific research examining selected areas of interplay between legal and other social processes (labor-management relations and agrarian disputes). The principal

aim is to formulate a new body of theory and methods—a social science of law and development—which will provide the conceptual framework for ongoing research, training and decision making in this field.

Present data collection in the six nations focuses on information indicating the scope and nature of changes in the societies and legal systems under study from 1945 to 1970. A fundamental hypothesis is that the legal system is an integral part of society and that social change will often, if not always, produce change in the legal system. The data being gathered fall into three major categories: social indicators, legal indicators, and background information on labor-management relations and agrarian disputes.

The social indicators include measurements of: population size and age structure; population density and urbanization; economic structure, national production, and the distribution of income; education levels; size and distribution among types of employment; social benefits covering old age, sickness and unemployment; mass communication and the diffusion of values; etc.

The legal indicators measure: (1) the number, organization, distribution and budgets of legal institutions—for instance courts, arbitration tribunals, legislative and administrative bodies, faculties of law, and legal assistance programs; (2) the volume, type, duration, resolution and appeal of legal processes—for example civil, criminal, labor, agrarian, tax, juvenile and other litigation, legislation, private ordering, and public administration; (3) the number, distribution, origins, selection and compensation of legal actors, such as lawyers, notaries, policemen, judges, judicial staff, administrators, law professors, and legislators and their staff; (4) significant changes in legal rules; and (5) changes in the attitudes and values people hold toward law.

The use of the social and legal indicators will permit testing of middle level hypotheses such as these: that litigiousness decreases with increasing economic productivity; that loyalty to the judicial system increases with urbanization of the population.

Finally, the study of labor-management relations and agrarian disputes entails an examination of the social and economic origins of conflicts in these areas, informal arrangements for their settlement, and the precise ways in which the legal system processes those disputes that cannot be resolved informally.

The Stanford Law School's relations with the group of nine Latin American and European scholars who are now directing empirical research have been close and cordial. In addition, the Law School maintains institutional arrangements with the Department of Law at the Pontifical Catholic University of Peru, the Institute of Legal Teaching and research in Santiago, Chile, and with the Institute of Comparative Law at the University of Florence, Italy. There has been an exchange of views and materials, furthermore, with the Yale Law School Program in Law and Modernization and close ties are maintained with the International Legal Center in New York City, which has sponsored meetings of law and development scholars.

Information Resources—A multi-volume series of studies on law and development will be based on data collected under the major research effort described above. In addition to one book for each participating nation, one volume will describe a general theory of law and development while another will compare the results found in the six nations. Other monographs and working papers on law and development will also be made available.

Although no single research collection in law and development exists at Stanford, a comprehensive collection at the Law School has been planned with particular reference to Latin American law and legal institutions. The Law School has already developed a basic collection of 25,000 volumes in Latin American law. Plans call for the acquisition of 10,000 additional volumes under this grant.

Stanford participates in an interlibrary loan program through which materials held in any of its libraries can be made available to other

libraries on request. In addition, xerox or microfilm copies of most materials held in Stanford libraries, including the Law School Library, may be obtained for an appropriate charge. Inquiries may be addressed either to a department library or to the Reference Department of Stanford's Main Library.

Consulting Services Although none of the professional personnel

associated with the Stanford program is currently available for contractual consultation work, such services are clearly a part of the program plan for the future.

In recent years faculty participants and scholars in residence have assisted the International Legal Center of New York City in formulating policy guidelines for the support of research in the law and development field.

OPERATION OF LEGAL SYSTEMS IN DEVELOPING COUNTRIES YALE UNIVERSITY LAW SCHOOL

Grant Program Director: Professor Jerrald Guben
Program in Law and Modernization
Yale University Law School
New Haven, Connecticut 06250

Departments Involved: The Yale University Law School, Departments of Political Science and Economics, and the Consilium on International and Foreign Studies

The Yale Program in Law and Modernization emphasizes study and empirical research on the operation of legal systems in developing countries and promotes work on basic legal and social science theory to further the comparative study of law in society. Toward that end, cross-disciplinary cooperation between the law and the social science faculties is an important ingredient of the Program.

The Program's focus is on the development of a general sociology of the legal profession applicable to current policy planning in particular countries, and on the development of a comparative social theory of law. In its activities in East Africa, the program emphasizes legal education and manpower planning; in India it specializes in the relationships between socialization and the practice of law; and in Brazil it investigates reciprocal relationships between the legal profession and patterns of political and economic organization.

Instructional Resources The instructional program in Law and Modernization is a fully coordinated course of

study. General theoretical instruction has been consolidated into one course which serves as an introduction to more advanced work which allows staff to probe more deeply into specific problems of the legal system of developing countries. The basic course, called "Introduction to Theories of Law in Society," incorporates contributions in legal history, anthropology, philosophy, sociology and economics.

Specific course offerings change from year to year, but the following list of courses presented in recent years indicates the range of the instructional program:

- Introduction to Theories of Law in Society
- Legal Problems in Developing Societies (foreign students only)
- The Role of the Legal Profession in Social Change
- Theories of Law in Society: Advanced Seminar
- Empirical Theories of Law in Society (India)
- Comparative Aspects of Civil Law and Common Law Systems
- Dispute Settlement (full year seminar)
- Law and Modernization
- International Private Investment

International and National Processes of
Social Change
African Legal Systems: Introduction
East African Law: Political Change and
Economic Development
Development of a Modern African Legal
System: A Case Study of Kenya

Faculty and instructional resources are enhanced by a number of Senior Fellows and Research Fellows with extensive experience in developing countries, and by many visiting scholars who participate in the Program for shorter periods. Recruitment of foreign fellows is usually based on some previous U.S. education or affiliation with institutions overseas with which the Program is engaged in other cooperative measures, or who represent a scholarly commitment to careers in law reform, in legal sociology, or in law and economics.

Both intra- and inter-institutional conferences are conducted under the auspices of the Law and Modernization Program. For example, a recent joint meeting with the Harvard Law School faculty was held on "The Relevance of Legal Anthropology to Comparative Social Research in Law," a program attended by scholars in different disciplines from eleven universities as well as by students and scholars in residence at Yale. Other conferences have been held on the general theme of law and conflict and on other topics related to major theoretical themes or empirical research concerns.

Although no short courses have been offered to date, the Program encourages such activity in the future on empirical research methods in law for foreign scholars working in established research centers in less developed countries.

The Program offers limited support to selected Graduate Fellows. In recent years Graduate Fellows of the Law School have included citizens of India, Malaysia, Ethiopia, Tanzania, Brazil and Chile.

Research Resources Special research capabilities represented in the Law and Modernization Program are

largely to be found in the area of sociologically-oriented empirical study of national legal systems and dispute resolution processes. In this regard the Program works in conjunction with another Yale University activity, the Russell Sage Program in Law and Social Science. The latter is administered, along with Russell Sage Fellowships in the subject area, through the Department of Sociology.

The research strategy of the Law and Modernization Program is designed to carry out the following:

1. A series of investigations in legal sociology for comparisons within specific geopolitical areas (e.g., Anglophonic Africa) and between differing areas (e.g., India-East Africa).
2. Research on those aspects of legal education and the legal profession useful in (a) developing a general sociology of the legal profession, (b) current policy planning in particular countries, and (c) developing a comparative social theory of law.
3. Coordination of the design of projects in East Africa, India and Latin America.
4. Development of fellowship openings to support these research projects.
5. Planning research in conjunction with scholars from other institutions.

The Program maintains, with 211(d) support, an Overseas Research Fund to support field and research work abroad. It is set up as a University account to which yearly allocations are made, and it supports faculty, fellow and student research outside the United States. Empirical research under the Program is currently under way in the Sudan, Ghana, Senegal, India, Ceylon, Taiwan, and Brazil.

Several informal working relationships with academic institutions are important instruments in the Program's overseas research interests. The most advanced liaison is with the Catholic University of Rio de Janeiro, with which an informal faculty exchange has been initiated. A research relationship has also been established with Benares Hindu University in India. Cooperation has also been dis-

cussed with the Instituto de Docencia e Investigacion Juridica of Chile, and the Catholic Law School of Lima, Peru. Close informal ties have been established with other U.S. centers of research in the comparative study of law in society, including the Law Schools of Stanford, Harvard and Wisconsin.

Faculty research in Law and Modernization has included such subjects as the following:

- Theory of law, planning and economic development
- Theoretical analysis of legal change in Kenya
- A utilitarian model of the role of private law in economic change
- Development of capital markets in Brazil
- Law and ritual in Senegal
- Forms and settings of dispute settlement
- Role of lawyers in conflict management
- The anthropology of law
- Development of a modern African legal system: Kenya.

The results of a number of these investigations are published.

Graduate student research topics involving overseas assignments in the most recent years illustrate the character of the student research program:

- Ghana: relationship between law and land development in the growth of the new port city of Tema
- Taiwan: evolution of customary Chinese contract law in the 20th century
- Costa Rica: legal institutions of the Central American Common Market
- Cuba: operation of public tribunals
- Nigeria: customary law of the Igala.

Information Resources Information services take the form of various types of program publications, since no formal policy or channels for inter-university cooperation or for joint cataloging thus far exist. Legitimate scholars wishing to use the considerable library resources associated with the Program, however, can be accommodated. Especially noteworthy is the Program's

extensive collection of African materials; substantial collections of materials on Indian and Brazilian law are also in the process of development.

Several of the above mentioned faculty research studies and other papers were published in book form under the title of *Essays in the Social Theory of Law* (Yale University Press, 1972), and the study of capital development in Brazil was issued in Portuguese under the title, *O Mercado de Capitais e os Incentivos Fiscais*, in Rio in 1971.

The Law and Modernization Program publishes a reprint series, a series of working papers, and other publications which do not fall into these two categories. Thus far the reprint series includes "A Bibliography of the Customary Laws of Kenya," "Customary Laws of Wrongs in Kenya: An Essay in Research Methodology," and "Law, Planning, and the Development of the Brazilian Capital Market." Published working papers include the following titles: "Conflict, Lawyers and Economic Change," "A Problem of Ritual Symbolism and Social Organization among the Diola-Bandiak," "Forms and Settings of Dispute Settlement," and "Law against Law" (Brazil). Other publications have included "Essays in the Social Theories of Law" and "Resolving Conflict in Africa." Copies of these may be obtained by writing the Administrative Assistant, Program in Law and Modernization.

Consulting Services Individual professional staff of the Program are active in consultation assignments with AID, the International Legal Center, the Ford Foundation, and several national governments. Individual members of the staff are free to enter into consulting contractual relations, either in individual or team relationships, but the Program on Law and Modernization does not as a separate entity provide advisory services.

The specific kinds of consultation capability are suggested in the other subsections above. Generally, consultation has been in connection with Latin American, East African, and South Asian problems in the subject area.

Comparative Legislative Studies

The role of legislatures in nation-building, national integration, economic modernization, and in the participation of people in the political process has until recently received little attention. As instruments, and sometimes as obstacles, of developmental change, national legislatures have too often been taken for granted or ignored while attention focuses on the executive and administrative functions of government.

University	Field of Technical Concentration	Geographic Concentration
Duke University	Legislative influence on specific developmental problems with reference to legislative institutions.	South Asia, Latin America, Africa and British Commonwealth
University of Hawaii	Institutionalization and functions of legislative bodies in selected areas, with linkage to national development.	Asia and the Pacific
University of Iowa	Inter-country comparative studies of legislatures and their performance.	Africa and Asia

Each of the three institutions has benefited from the development of extensive studies and data collection in this field over a period of time. Furthermore, each program is interdisciplinary: at Duke University the disciplines of political science, sociology, economics, and history are participating; at the University of Iowa the disciplinary emphasis is in political science and history; the University of Hawaii calls into play the disciplines of political science, history, and its strong program in Asian languages.

A Legislative Studies Coordination Office, located at Duke, is designed to facilitate the professional cooperative activities among the three universities. Requests by foreign and domestic students and established scholars may be directed to this office or to the University whose program is most directly related. It also handles secretariat functions involving the distribution of student and service inquiries within the consortium, and assists in joint publication and information dissemination activities. An Inter-University Advisory Committee for comparative legislative studies involves faculty representation from the three cooperating institutions and from among U.S.

and foreign scholars associated with cooperating programs. The Program Director at Duke University is currently serving as chairman of the Committee. The Committee advises the three institutions on monitoring activities, evaluating and coordinating research, facilitating the exchange of students and faculty and the arranging of joint conferences and symposia.

The three universities will also coordinate with the more technical assistance-oriented program in legislative development conducted by the State University of New York at Albany.

This inter-university agreement will provide the kind of "critical mass" of information and activity which is needed to develop the subfield of comparative legislative studies in relation to the development process. It is anticipated that the combined resource will be useful both to donor agencies and directly to less developed countries.

At AID/Washington the three grants are managed by the Civic Participation Division, Office of Policy Development and Analysis, Bureau for Program and Policy Coordination.

**LEGISLATIVE INFLUENCE ON SPECIFIC DEVELOPMENT PROBLEMS
(SOUTH ASIA, LATIN AMERICA, AFRICA,
BRITISH COMMONWEALTH COUNTRIES)
DUKE UNIVERSITY**

Grant Program Director Dr. Allen Kornberg
Dept. of Political Science
Duke University
Durham, North Carolina 27706

Departments Involved Departments of Sociology and Anthropology, Political Science, Economics, and History; African Studies Program, Program in Comparative Studies in South Asia; Institute for Policy Sciences and Public Affairs.

The Duke University program in Comparative Legislative Studies concentrates on studying legislative influences on specific development problems such as urbanization, population, education, and rural development. At present, seminars and related research on "Modernization and Legislative Roles in the Urbanization Process" are under way at the University and demonstrate the direct applicability of the program to problems of development in low income countries.

The program, as coordinated with the other two participating universities, has two major purposes: (a) development of institutional

capacities to provide skills relevant to the comparative study of legislative organization, function and impact as these relate to the process of societal modernization; and (b) the generation and collation of a body of principles for donor agencies and developing countries which can be useful for policy decisions relating to the support of legislative institutions as facilitators of development.

To carry out these purposes involves (a) training U.S. and foreign students for systematic research on the varying roles that legislatures perform in the development process, (b) diffusing relevant methodological tools to less developed countries for improving their understanding of this interrelationship, (c) facilitating the work of foreign scholars in regard to the role of legislatures in development programs, (d) catalyzing and institutionalizing multilateral efforts in this sub-discipline, and (e) increasing the world-wide

pool of professional and expert consultants in this field of activity.

Instructional Resources The instructional goal of the program at Duke University is to provide extensive materials to incorporate into already existing courses in such areas as comparative politics and comparative sociology, rather than to develop new courses.

However, seminars and conferences in the subject area present materials which go beyond the standard curriculum. For example, a special seminar on Urbanization and Modernization raises central question about the urbanization process in relation to development and considers a variety of existing urbanization policies (e.g., the building of new capitals, and construction of new industrial and residential cities, rural-urban migration, industrial location and relocation). The role of national legislatures in the conception, adoption, and implementation of such policies receives particular emphasis. Another seminar, on the methodology of comparative research in this field (Department of Sociology) utilizes source material developed in the Urbanization seminar.

Scholarly conferences support the instructional intent of the program at Duke University. Of those currently planned, one deals with multilingualism as a factor in legislative organization; another with the impact of pluralistic social organization on legislative development; and a third with the role of political, social, and economic factors in the establishment and legitimation of the Japanese Diet. Foreign scholars are invited to participate in these conferences, along with advanced students as appropriate.

Special non-degree training programs in the subject area are encouraged. They can be arranged for program operations personnel upon request and are adapted to individual needs.

A portion of the grant funds has been reserved for supporting training and research of qualified U.S. and foreign scholars interested in the subject area of the grant. Because they are already professionals whose

available time and resources vary, no fixed amounts are set.

Foreign students applying for admission to the Graduate School are eligible to compete for fellowships covering a stipend of \$2,400 for a twelve-month year and full tuition. Such applications are encouraged and receive special attention. A course in English for foreign students is offered for those who do not quite meet admission requirements in this regard.

Research Resources Social science research resources at Duke University are unusually extensive, both in library and special collections (see below) and in related programs and centers. Among the latter are the Cooperative Training Program in Population and Ecology, the Research Training Program in Mental Health, the Social Systems Simulation Program, the Center for Commonwealth Studies, the Program in Comparative Studies in South Asia, the African Studies Program, and the Committee on International Studies. The University's membership in the Interuniversity Consortium for Political Research and in the Roper Public Opinion Research Center also provide resources and data repositories.

Duke's computing facilities for social science purposes are among the world's largest of their kind. They are developed around an IBM 360 Model 165.

Special efforts are made to provide overseas research opportunities for both faculty and graduate students. Members of social science faculties associated with the grant program have worked in such diverse settings as Colombia, Brazil, Chile, Canada, Nigeria, Kenya, Tanzania, India and Taiwan.

Books published over the past decade as a result of the University's concentration in the subject area include the following titles:

- Canadian Legislative Behavior: a Study of the 25th Parliament (New York, 1967)
- Legislatures in Developmental Perspective (Duke University Press, 1970)
- Legislatures in Comparative Perspective (New York, 1971)

The Structure of Communities (in process)
 The Nigerian Political Scene (1962)
 Post-Primary Education and Political and Economic Development (1964)
 The Twentieth Century (Great Ages of Man Series, 1968)
 India's Search for Nationality (New York)
 From Zamindar to Ballot Box: Community Change in a North Indian Market Town (Cornell University Press, 1969)
 Urban India: Society, Space, and Image (Duke University 1971)
 Kin, Clan, Raja, and Rule in Northern India (University of California Press, 1971)
 Computer Simulation Techniques (New York, 1966)
 The Impact of the Computer on Society (Atlanta, 1967)
 The Design of Computer Simulation Experiments (Duke University Press, 1969)
 Computer Simulation Experiments with Models of Economic Systems (New York, 1970)
 Ministers of Modernization: Elite Mobility in the Meiji Restoration, 1868-1873 (University of Arizona Press, 1964)
 Explosive Forces in Latin America (Ohio State University Press, 1964).

In addition to these, fifty-nine articles are listed in the current list of publications associated with the Program in Comparative Legislative Studies or produced by those associated with it in scholarly journals and publications. Listings may be obtained from the Program Director's office.

Although opportunities for foreign travel and research by graduate students are less common than those for faculty, the following list of research papers developed by graduate students serves as an indicator of their overseas research activities:

Jomo Kenyatta's Concept of Parliament: Nation-Building and Representative Institutions in Kenya
 The Legislative Council in Northern Rhodesia, 1959-1963
 Institutional Adaptation to Rapid Political Change: a Study of the Legislature in Zambia, 1959-1969

The Bugisu Cooperative Union, and Political, Social and Economic Modernization of Bugisu District, 1969-71
 Religion and Social Change in Northern Ireland
 Politics and Public Policy in a new Nation: Higher Education in Nigeria
 Caste, Politics and Democracy in Bihar State, India
 Judicial Review of Administrative Action in Nigeria
 The Development of District Councils in Sokoto (Nigeria)
 Rural Development and Administration in East Pakistan
 Kinship Organization of Bant-Nedava Caste-Complex
 Social Person and Social Order in New Guinea Society
 A Study of Careers of Big Men among the Rama Indians of Eastern Nicaragua
 South Indians in Delhi Voluntary Associations and Social Networks.

Collaborative arrangements with institutions in less developed countries are encouraged, particularly with those with strong social science programs or special programs on population, urbanization, education, communications, politics, development and legislatures. Geographic preference, though open, is expressed for institutions in British and French Commonwealth countries, Latin America, and western Europe.

Information Resources Duke University's combined libraries maintain holdings of more than two and a quarter million volumes, four million manuscripts, over ten thousand periodicals and fifteen thousand serials, which places it among the largest of American university libraries. Interlibrary Loan servicing is active, and inquiries should be addressed to Interlibrary Loan Service, Perkins Library, Duke University. Coverage and acquisitions in all areas relevant to the Comparative Legislative Studies Program are substantial, and special geographic collections are maintained on Japan, Latin America, India and South Asia, and the British Commonwealth Countries.

The University contributes and has access to a data bank of materials relevant to comparative legislative studies which is being established at the Comparative Legislative Research Center of the University of Iowa. The three grantee universities will cooperate in preparing and issuing specialized bibliographies, and a preliminary edition of one on urbanization and modernization prepared at Duke may be obtained by writing the Department of Sociology and Anthropology. A newsletter covering current work in the field of comparative legislative studies is being developed by the Legislative Studies Coordination Office located at Duke University. Other publications will follow the development of the tri-university program in legislative studies.

Consulting Services Thus far two senior members of the legislative studies program at Duke University have carried on consultation work in the subject area. One has worked with AID (through the State University of New York) on the provision of technical services to legislatures, and both have served as consultants for the National Science Foundation and for the Canada Council to assess research proposals dealing with all aspects of the political process in development.

Combinations of consultation specialties of individual university staff associated with the program include the following:

Legislative membership, outputs, and organization; political behavior and modernization
 Political elites; urbanization and population, research design and methodology, modernization
 Policy and economic planning (Brazil)
 Population policy, urbanization (Colombia, Egypt)
 Legislative development, community organization (East Africa)
 Mathematical models
 Pluralism conflict and legislative development
 Legislative development (Chile)
 Modernization, social and political development (Latin America)
 Modernization and legislative organization (Japan)
 Population and public policy, research design (Jamaica, Puerto Rico).

Any staff member associated with the program can engage in individual, team, or inter-institutional consultative collaboration. Basically consultation contracting is an individual matter at Duke University, and individual staff may be contacted directly or through the Legislative Studies Coordination Office at the university.

**INSTITUTIONALIZATION AND FUNCTIONS OF LEGISLATIVE BODIES
 (SELECTED AREAS OF ASIA AND THE PACIFIC)
 UNIVERSITY OF HAWAII**

Grant Program Director: Dr. Norman Meller
 Dept. of Political Science
 University of Hawaii
 Honolulu, Hawaii 96822

Departments Involved: Departments of Political Science and Sociology; Social Science Research Institute.

The University of Hawaii's grant program

on comparative legislative studies calls for expanding the University's curriculum in the subject area through visiting foreign and U.S. scholars, initiating new and innovative research, and developing new knowledge about

the role of legislative institutions in national development, with particular reference to the Pacific area. It builds upon the University's existing geographic focus on East Asia, Southeast Asia and the Pacific Islands, and integrates the program of legislative studies within its country and area specialization programs, with special emphasis on Korea, Japan, the Philippines, Thailand, Indonesia, and selected Pacific Islands.

The Hawaii program compares legislative roles in various countries with different economic growth rates and standards. It also emphasizes the economic implications of relatively weak and relatively strong legislative systems. The approach to these studies is interdisciplinary to include political science, history, sociology, and utilization of the University's noted Asian languages program. Some of the specific matters studied are:

- (a) The role of legislatures in helping to create national political elites.
- (b) The legislative role in economic decision-making and in furtherance of economic development programs.
- (c) The role of legislatures, in conjunction with political parties, in encouraging the emergence of channels through which relatively routinized political demands can flow.
- (d) The role of legislatures in permitting accession of new classes into the political process, and
- (e) The changes in functions performed by legislatures at differing stages in national development.

At the University the Department of Political Science is most immediately and directly concerned with legislative institutions. However, participation in the legislative studies program includes historians, sociologists, and other social scientists. Administration of the grant program is carried out under the aegis of the University's Social Science Research Institute and will therefore encompass a broad range of disciplines. The program at Hawaii is in full partnership with those at Duke, Iowa, and SUNY at Albany.

Instructional Resources The instructional aspect of the program at Hawaii is carried out through ongoing graduate programs in Asian and Pacific Studies and through the professional social science departments. The Political Science Department includes five staff members who have had a continuing professional interest in the study of legislative organization and behavior in the politics in and around the rim of the Pacific, and five with substantial interests in political research closely associated with the study of legislatures. The Sociology Department lists ten staff members with long-term field experience in as many Asian nations. University participants in programs in Anthropology, Public Health, Social Work, and Urban Studies and Planning are also experienced in public policy issues and the legislative role in relation to them. Should the advanced student require training in languages to carry out field research, formal instruction is available at the University in Chinese, Japanese, and Korean; Bengali, Hindi, Marathi, Pali, and Tamil; Burmese, Lao, Indonesian, Tagalog, Thai, and Vietnamese; as well as in Hawaiian and other Pacific Island languages. Foreign students may receive the assistance of the University's English Language Institute.

Special emphasis is given to assisting scholars from developing countries in Asia and the Pacific Islands through training programs and research collaboration. Visiting scholars are expected to teach courses, participate in seminars, or direct research assignments while in residence.

As instructional asset available to the program is the interest of the Hawaiian State Legislature itself, which frequently welcomes legislators and service aides from Asian and Pacific countries for short term observation and extended in-service tours. The Legislative Reference Bureau, formerly maintained as a unit of the University, has over 25 years of legislative service experience. It biennially conducts a legislative orientation program, and its reference collection of some 59,000 items is available for research and training purposes.

A limited number of "awards" are available for the assistance of graduate students, and their field research for Ph.D. dissertations is to be funded as feasible.

Research Resources The faculty and students participating in the legislative studies program have the use of the University's extensive computer facilities (IBM 360/75 and 7040/1401 systems, plus supporting equipment) statistical consultation, and data banks, as well as access to the Inter-University Consortium for Political Research of which the University of Hawaii is a member.

The University's plans provides for appointments of Research Affiliates to the program individual U.S. and foreign scholars from other institutions. In some cases they are affiliated for activities at the University of Hawaii; in other cases their appointments are for support for research and activities elsewhere which complement and enrich the program at Hawaii. They serve as guest professors, guest lecturers and visiting faculty, participants in conferences and symposia, and as collaborating research workers under joint projects with U.S. and foreign colleagues.

The research portion of the legislative studies program at Hawaii focuses its attention on the institutionalization and the functions of legislative bodies in selected areas of Asia and the Pacific. It endeavors to identify linkages with the successive stages of national development and, ultimately, to formulate a more inclusive developmental model that integrally incorporates the legislative system.

Construction of a developmental legislative model is supported in part by studies of early legislatures in America, monarchical and republican legislatures in Hawaiian history, and the National Diet of Japan by historians at the University. Simultaneously, different forms of legislative systems and the manner in which larger policy considerations respond to the "crises" of nation-building and political participation, both with the presence and absence of legislative sub-systems, are analyzed.

Information Resources Applicable resources connected with the

Hawaiian Legislative Reference Bureau, the Social Science Research Institute, the Economic Research Center, and the various institutes of the East-West Center located on the Manoa campus are already well known to scholars. To supplement "them," working collection are being made of legislative records of Asian and Pacific countries including official proceedings, records of floor debates, committee hearings, and personal accounts of participants. These are accessioned by the University of Hawaii Library, and are to be permanently available for use by any interested scholar. The plans are closely coordinated with the development of archival material at the University of Iowa.

Recent books related to the Legislature and development published by faculty participating in the University's legislative program include:

"Legislative Structures: Some Thoughts on Elected National Assemblies" and "Legislative Staff in Oceania as a Focus for Research" in *Legislatures in Comparative Perspective* (David McKay Company, Inc., 1973)

Administrative Reform and Political Responsiveness (Sage Publications, 1970)

The Congress of Micronesia (University of Hawaii Press, 1969)

Representation and Roll Calls (Bobbs-Merrill Company, 1969)

The Korean Decision (Free Press, 1968)

Fiji Goes to the Polls (East-West Center Press, 1968)

Papers on the Papua-New Guinea House of Assembly (Australian National University, 1968)

The Development of an Interest Group (University of Philippines Press, 1966)

Thailand: The Modernization of a Bureaucratic Policy (East-West Center Press, 1966)

The Korean People's Democratic Republic (Hoover Institute, 1966)

Administration in Developing Countries (Houghton Mifflin Company, 1964)

Community Power Structure and Political

Change in Reed Town, Japan (Keiso-shobo, 1971) (English in process)
Philippine Legislative Behavior (in process)

In addition, faculty have contributed numerous comparative legislative studies which have appeared in compendia and learned journals.

Consulting Services Various staff associated with the program have had extensive experience in overseas consultation through AID and other agencies. This includes specialization in legislative bill drafting, research and reference, and record keeping. Consultation services are an integral part of the Hawaii program.

**INTER-COUNTRY COMPARATIVE STUDIES OF LEGISLATURES
(AFRICA & ASIA)
UNIVERSITY OF IOWA**

Grant Program Director: Dr. Gerhard Loewenberg
Dept. of Political Science
University of Iowa
Iowa City, Iowa 52240

Departments Involved Department of Political Science, Department of History and Sociology, College of Law.

The program's purposes and methodology are similar to those reported for the other two university components of the Comparative Legislative Studies consortium.

The program at the University of Iowa concentrates on legislative behavior variables that help explain three specific system characteristics: (a) the scope of politics, (b) the style of government, and (c) the legitimacy of the regime. For this purpose the program examines relevant comparative factors in a number of African and Asian legislative institutions and at various points in time. The latter requires the use of time series data and historical sources.

For each of the legislatures studied, analysis is made of (a) attributes of legislative members (process of recruitment, social and occupational backgrounds, politically relevant skills, role orientations, length of tenure); (b) distribution of power within the legislative system (party and committee structures, rules of procedure, leadership groups, composition and role of legislative staffs, kinds and frequency of legislative sessions); and (c) the outputs of the institutions (agenda of issues,

modes of contention, quantity and kinds of decisions).

Africa and Asia are the primary geographic areas of focus for the program at Iowa. Legislatures selected for study, some which have had considerable institutional continuity over time, and some which have been only recently established; some which are salient to the public and some which are not. Whether these variables affect the role of legislatures in political development is closely examined. Departmental emphasis is provided primarily by the departments of Political Science and History.

A principal component of the program at the University of Iowa is the development of a major computerized data bank on the attributes of legislators and on legislative performance. (For more detail see below under "Research Resources.")

Instructional Resources As with the other programs in comparative legislative studies, that at Iowa is interdisciplinary, although centered in the Department of Political Science. A four-year graduate curriculum has been established, specifically designed to train U.S. and foreign students in legislative research. The instructional program includes a thorough grounding in the methods of comparative analysis, the

substance of comparative politics generally, and the comparative study of legislative behavior in particular.

Graduate students are associated directly with research in which faculty members are engaged through the Comparative Legislative Research Center. Students spend up to one year in field research. Foreign scholars expert in the legislative process in their own countries are also involved in the teaching program, hold visiting appointments at the University and participate in supervising field research and in working with faculty to help design research assignments. Fellowships for graduate students specializing in comparative legislative studies are available on a selective basis. Inquiries should be addressed to the Program Director, Comparative Legislative Research Center.

For the past six years an advanced seminar on comparative legislative behavior has been offered jointly by the Departments of Political Science and History. A new seminar on comparative legislative research is now offered in which five faculty members, graduate fellows in the comparative legislative research program and foreign scholars collaborate.

Faculty members in the Department of Sociology, who are interested in organization theory, and professors in the College of Law, who are interested in legislative processes, provide further expertise available to students of legislative behavior at the University of Iowa. Training in research methods is an important component of the instructional program; five members of the Department of Political Science teach in this field. Courses in statistics are offered by the Departments of Sociology and Educational Psychology.

Research and Informational Resources. A substantial facility for research training and processing at the University of Iowa is maintained by the Department of Political Science as a Laboratory for Political Research. Fulltime staff in the Laboratory include a director, assistant director, technical director, a supervisor of study processing, a supervisor of data processing, and a programmer. Currently thirteen

graduate students work in the Laboratory, receiving training in data collection and analysis. Facilities include a card reader-line printer connected to the University's 360 model 65 IBM computer, two typewriter terminals for interactive programming, three keypunches, unit record equipment, and substantial disk and tape storage for data. The Comparative Legislative Studies Program will rely heavily on the facilities and staff of the Laboratory.

With this facility the University has special competence in procedures for computer organization of data banks and for the processing of large data sets. It has contributed significantly to the development of data sets and systems for the Inter-University Consortium for Political Research, of which Iowa is a member.

Although a substantial amount of legislative data has been collected by individual scholars in many different countries, very little of this material is comparative, centralized, or follows a common format. The University of Iowa, therefore, is establishing a data archive to bring existing legislative studies and related materials together and make them accessible widely to scholars in this field of inquiry. The data, systematically organized, will be used both for training graduate students and for supporting collaborative research. Once gathered and reorganized, appropriate data sets can be made available to Duke University and the University of Hawaii, and specific data can be processed for individual scholars and institutions overseas. As a first step, a bibliography of over 1,100 studies of legislative behavior has been compiled. It is machine readable and accessible through the ERLM information retrieval system.

Consulting Services. The University of Iowa provides assistance under separate financing arrangements, to developing countries and agencies in a number of ways and through a variety of channels. The role of the Data Archive in this process will be of prime importance, but technical assistance and advisory services are also be

extended. Such services are, of course, coordinated with the other two universities in the consortium. Several members of the department at the Iowa University have experience in consulting work. Their specialities include:

Legislative Staffing
Survey Techniques
Computer Application
Policy Process
Data Processing and Archiving

Economic, Social And Political Development And Modernization

Several 211(d) grants have been made to support broadly ranging investigations and studies which integrate social sciences, economics, and political science. The universities listed under the Midwest Universities' Consortium for International Activities (MUCIA) develop and guide activities jointly through a headquarters at Indiana University. The remaining universities work separately and independently. These grants are grouped together in this directory because of the nature of their responsibilities.

University	Field of Technical Concentration
Midwest Universities' Consortium for International Activities Indiana University University of Illinois Michigan State University University of Minnesota University of Wisconsin	Institution building and technical assistance methodology
University of Michigan	Economic policy and development in Africa emphasis upon French- speaking Africa
Southern Illinois University	Studies and activities related to Vietnam
Tufts University	Major problems of development and modernization popular participation
Pace University	International trade and finance Export generation for developing countries

Concentrations of interests within these universities includes such as the following: generation of foreign exchange through exports; problems of public sector decision-making; wage policies and manpower planning; maximum participation in the task of economic development on the part of the people.

The Midwest Universities' Consortium grants are managed in

AID/Washington by the Office of Program and Methodology, Bureau for Technical Assistance.

The remaining grants are managed in AID/Washington as follows: University of Michigan by the Office of Development Services, Bureau for Africa; Southern Illinois University by the Office of Technical Development, Bureau for Supporting Assistance; Tufts University by the Office of Policy Development and Analysis, Bureau for Program and Policy Coordination; and Pace University by the Office of Export Development Assistance Staff, Bureau for Program and Policy Coordination.

**PROGRAM OF ADVANCED STUDIES IN INSTITUTION BUILDING
AND TECHNICAL ASSISTANCE METHODOLOGY (PASITAM)
MIDWEST UNIVERSITIES CONSORTIUM
FOR INTERNATIONAL ACTIVITIES (MUCIA)**

**Indiana U.
U. of Illinois
Michigan State U.
Univ. of Minnesota
University of Wisconsin**

Grant Program Director: Dr. William J. Siffin, Director
International Development Center
Indiana University
Bloomington, Indiana 47401

The Program of Advanced Studies in Institution-Building and Technical Assistance Methodology (PASITAM) aims to improve the defining of certain kinds of action patterns, and the implementing of certain kinds of developmental efforts. These heroic intents are reduced to potential manageability by jurisdictional boundaries. PASITAM addresses questions about two things: institution building and the methodology that is supposed to inform technical assistance.

The program is expected to build an increased capability within our collective academic framework—capability for use in better institutional development, and in better methods of rendering and using technical assistance.

Thus, PASITAM's own basic problem is to achieve action-oriented knowledge, and to develop means for delivering it to users. One means is the enlarged expertise of people within our own set of institutions. Another is materials that can be used by others. The

knowledge itself must come out of experience. Quite a bit of it—most of it, in fact—already exists; the task is to find, evaluate, relate, extend and prepare it for transmission.

We seek such experience, and its lessons about institutional development and the logic underlying methods of technical assistance, in a limited number of program fields. Not altogether arbitrarily, these are fields in which the United States technical assistance effort is focused.

Information Resources—PASITAM has established a Documentation and Analysis Center which monitors a flow of materials from a wide variety of sources—materials that contribute to our understanding of institutional development and technical assistance methodology and to capabilities for improved action. The Documentation and Analysis Center (DAC) also serves as a key means for disseminating

products of its own monitoring and of other aspects of the PASITAM program.

Our strategy contains three fundamental elements:

1. A direct documentation-and-analysis process/product effort;
2. Aimed at specified sets of targets selected with reference to our overall mandate;
3. Drawing upon selected intellectual resources available within MUCIA.

Users include: donor agencies, and agencies in developing countries engaged in planning and directing development efforts; academic institutions in the United States (including MUCIA) and abroad (including training and teaching institutions in developing countries); and other organizations engaged in training, analysis, and other activities related to development (such as evaluation, policy shaping, etc.)

Instructional Resources PASITAM endeavors to enrich the curriculum content of MUCIA universities

and universities and training institutes abroad by supporting course development, through its DAC and otherwise. It promotes the development of seminars, workshops and conferences as vehicles for applying and extending its knowledge.

Research Resources PASITAM is not primarily concerned with research in the academic sense of the term. Its projects are aimed at the application of existing knowledge to problems of institutional design and technical assistance method in such fields as rural health delivery, science and technology, rural development, public enterprise, and education. It does support several seminars and analysis efforts to assess and extend "conventional wisdom" and existing models of institutional design and development.

Consulting Services An objective is to build consultative capacities both within its staff and through the involvement of MUCIA faculty having appropriate skills and experience.

ECONOMIC, SOCIAL, AND POLITICAL DEVELOPMENT AND MODERNIZATION
Economic Policy and Development in Africa
(Special Emphasis on Francophone Areas)
UNIVERSITY OF MICHIGAN

Grant Program Director: Dr. Elliott J. Berg, Director
Center for Research on Economic Development
University of Michigan
Ann Arbor, Michigan 48108

Departments Involved: Center for Research on Economic Development (CRED) and Department of Economics.

The 211(d) grant to the University of Michigan's Center for Research on Economic Development calls for "strengthening within the university specialized competence in economic policy and development in Africa with special emphasis on Francophone areas."

The Center has been in existence since 1960; about thirty per cent of its budget is provided by the grant. Its overall mandate is, of course, more extensive than the specific purpose of the grant.

CRED is administered by a Director, Deputy Director and is supervised by an Executive Committee whose *ex-officio* members include the Dean of the College of Literature, Science and the Arts, and the Chairman

of the Department of Economics. At AID/Washington the grant program is monitored by the Office of Technical Assistance Coordination of the Bureau for Africa.

CRED associates combine work in less developed countries with teaching and research in Ann Arbor; its staff members are called upon frequently by various national and international agencies for studies and missions in the field. These include the United Nations Development Program, the Inter American Development Bank, IBRD, and the Ford Foundation.

Certain general principles guide CRED's operations: (a) A university research center specializing in development must combine teaching and research with field work in the less-developed countries themselves, since the relevance of its research and the meaningfulness of teaching depends on maintaining close contact with the real policy problems of LDCs. Periodic teaching, advisory work or research in the field, is therefore essential for all staff members. (b) A development oriented research institution in the industrialized world should not descend on a developing country from time to time, research it and disappear. Continuing collaborative ties between industrialized country universities and research centers and corresponding institutions in the LDCs are essential. (c) A research center in the development field also has obligations to a wider international community; a substantial part of its activities should be oriented toward needs of LDCs. The evolution of Center activities reflects these convictions.

The Center staff gives principal attention to four broad subject areas: (a) problems of public sector decision-making, particularly conceptual and practical issues in integrating planning and budgeting; (b) aspects of human resource development, including population problems, employment and income policy issues and industrial relations; (c) regional economic cooperation, and (d) industrialization and export policies. The Center continues to expand its staff and to consolidate its activities in Francophone Africa, begun last year.

Instructional Resources The Center itself offers no courses or certificates; these are provided within the standard teaching departments or other units of the University. The form of training most relevant to the Center's interests is graduate study in the Department of Economics. About a half dozen courses on international development are taught in the Department by associates of the Center.

CRED also supports instructional activities in other ways: (a) as an advocate within the University for a more substantial commitment by the teaching departments to students from the less developed world, particularly Africa; (b) by helping to recruit and screen suitable graduate candidates through its contacts abroad; (c) by providing financial support to graduate students from LDCs, especially Africa; and (d) by providing counseling, tutoring, research aids, and other forms of assistance.

In addition to the formal courses in economics and development taught by members of the CRED staff, seminars and discussion groups are held at the Center. The following subject matter is illustrative: employment, migration and labor markets; rural development; trade; industrialization; planning; country studies; alternative models of development; and general theory. Meetings on specific doctoral thesis proposals or problems include both faculty and students. Students in economics also are oriented toward the contributions of other disciplines to international development in a series of lectures and discussions.

The Center offers assistance and support to students from the developing countries. In 1972-73, a special program of tutoring was implemented to assist graduate students of economics from developing countries in their studies. Also, the first scholarship award was made to a Francophone African student to enter the study of graduate economics at the University of Michigan. This award included special arrangements for English language training, among other features. A brochure of "Information for Graduate Students from

Abroad" issued by the University's Horace H. Rackham School of Graduate Studies, may be obtained on request.

Research Resources Essentially, the research program of the Center is an amalgam of each staff member's research interests; in that sense it is not an overall coordinated program, although it has common centers of interest and concern; its research activities are linked by a common inclination toward empirical and policy-oriented research.

The Center staff has increasingly specialized its research on African related development themes. Well over half of research activity having a geographic focus was related to sub-Saharan Africa. Three major research projects have been launched; the largest of these was Dr. Judith Harrington's study of "Demographic Economic Aspects of Nigerian Migration." In addition, the pilot project of Dr. Charles Staelin's "Impact of Export Incentives on Philippine Export Firms" was approved for financing, and Professor Wolfgang Stolper began his research, "Tunisia's Economic Development, 1961-1971". Also, CRED grants were awarded to five members of the University of Michigan faculty as supplementary support for research related to the development and modernization of French-speaking African countries. In addition to student assistance to faculty research mentioned above, dissertation research is frequently carried out abroad under Center auspices. On the Michigan campus two important and unusual research resources warrant mentioning: the University Computer Center and the CRED Library (see below).

Information Resources The Library of the Center for Research on Economic Development offers services which complement other library facilities on the campus and has been careful to avoid overlap in acquisitions. The CRED Library is distinguished for its collections of national development plans and government documents. Specifically, it includes the following:

- (a) 700 development plans from 80 less developed countries on microfiche.
- (b) over 4,000 titles consisting of some 8,000 individual items from less developed countries, three-fourths of them from Africa.
- (c) subscriptions to over 200 periodicals from many parts of the world dealing with economic development

The collection also includes more than 400 volumes with emphasis on French-African material which would be difficult to duplicate from other sources. All of the books in the Library have now been reclassified using the Library of Congress card system. A list of acquisitions of the CRED Library and monthly index of periodicals is published monthly and these are available on request.

Several brief bibliographies of holdings, on such subjects as the Nigerian civil war, have been prepared. The Library has actively pursued contacts with other libraries and centers for exchange of both original and duplicate publications. Through the University of Michigan General Library, the CRED Library participates in interlibrary loan service with other libraries in the United States, and also maintains a relationship with the Center for Research Libraries in Chicago.

Consulting Services Several forms of consulting services have been established by the Center. One involves direct services to governments of less developed countries, under USAID financing. The principal current example of this is an agreement for providing technical assistance to the Planning Secretariat of the Government of Morocco over a three-year period. Shorter term consultation has also been carried out with the Ministry of Planning in Tunisia, under Ford Foundation auspices, and annual participation in the Conference on Development Strategy of the Liberian Government. Other examples of AID consultation services have included participation in the studies of the Nigerian Policy Review Team and advisory services to the Vihiga Rural Development Project in Kenya.

The Center also provides faculty and "Junior Scholars" (Ph.D. candidates) to several universities overseas, including the University of Thailand. This program of overseas faculty assignments is in Most Rockefeller Foundation auspices.

Professional personnel associated either directly or indirectly with the Center's program represent the following principal research interests (with geographical specialization if relevant):

Wage policy, manpower planning, human resources (Africa)

Demography (West Africa)

Planning, Budgeting and Health Care (East Africa mainly)

Economic Theory: optimization, econometrics, development (Africa)

Development economics (Africa, Middle East, Latin America)

Import substitution policies

Fiscal policy

Planning and budgeting

Commercial policy and industrialization (Africa, South Asia)

Planning and budgeting

VIETNAMESE STUDIES SOUTHERN ILLINOIS UNIVERSITY

Grant Program Director: Dr. Basil C. Hedrick and
Grant Program Directors: Dr. Gene Hsiao, Edwardsville Campus
Dr. Nguyen Dinh-Hoa, Carbondale Campus
Center for Vietnamese Studies
Southern Illinois University
Carbondale, Illinois 62901

Departments Involved: the Center for Vietnamese Studies is an integral part of the academic programs of the University and involves the cooperation of numerous departments.

During the past decade Southern Illinois University staffed and carried out programs of educational assistance in Mali, Nigeria, Afghanistan, Nepal, Thailand, and Vietnam. Its technical assistance programs in Vietnam were supported by two contracts with AID - one in vocational educational (1961-66) and another in elementary education (1961-1971). Under these two programs forty-one staff members of the University provided over a thousand man-months of advisory services in Vietnam, and many Vietnamese matriculated as students on the Carbondale campus. With this experience background, the University established its Center for Vietnamese Studies and Programs in 1969. It was the first Center of its kind in American higher education. Its establishment was

shortly followed by the award of the 211(d) grant.

The Center is primarily an academic coordinating and servicing entity. It does not maintain separate degree programs nor does it have an independent faculty. Its purpose is to stimulate and support the development of appropriate academic courses (including intensive language studies), research studies on Vietnam, acquisition of library and other research and teaching materials, and in general to provide a scholarly facility in which faculty and advanced students in various disciplines can be brought together in studies and activities related to Vietnam. The program of the Center is distinctly inter-disciplinary, calling on the resources of faculties in anthropology, community development and sociology, economics, education, government, journalism, and languages, among others. Inter-disciplinary collaboration is organized through the Center's Advisory Committee on Asian Studies.

Instructional Resources Vietnamese studies are offered at both graduate and undergraduate levels. In recent years instructional courses have included the following:

Elementary, Intermediate and Advanced Vietnamese Language
Grammatical Structures of Vietnamese
Intensive Elementary Lao
Intensive Elementary Cambodian
Survey of Vietnamese Literature
Cultural Traditions of Indochina (Vietnam)
Cultural Traditions of Indochina (Laos and Cambodia)
Ethnology of Southeast Asia
Government and Politics of Vietnam, South and North
Seminar in American Foreign Policy (Vietnam)
Problems of American Foreign Policy (Vietnam)
Seminar on Southeast Asian Journalism.

A special summer program in the spoken language of Vietnam involves twenty hours of intensive training per week, including three contact hours and one hour of laboratory every day. One section of this program is devoted to the southern (Saigon) dialect, the other the northern (Hanoi) dialect.

Public lecture covering such subjects as Vietnamese literature, arts, history, etc. add to the instructional resources of the program. Visitors from Vietnam distinguished in public affairs and scholarship are also an important part of the educational scene.

Research Resources Vietnamese Research Fellowships are made available by the program to help meet the critical shortage of highly trained specialists on Vietnam and to aid the significant number of graduate students in American universities who wish to pursue further scholarly studies on Vietnam. These awards carry annual stipends up to \$7,500 plus overseas research travel costs. Considerations in awarding the fellowships include (a) commitment to careers in teaching, research, government, business, or

other professions centering on Vietnam and Southeast Asia; (b) extensive academic background or field experience in Southeast Asia; (c) appropriate language preparation; (d) approved graduate status in a specific discipline; and (e) outstanding academic promise.

As a research organization, the Center assists both academic departments of the University and private and government agencies. Internally, SIU Vietnamese research concentrates on (a) assessing the University's and related experience in Vietnam for guidance on the design of Vietnam programs; and (b) collecting Vietnamese language materials and literature and materials about Vietnam to support scholarly research.

Research programmed through the Graduate School has included such topics as:

Analysis of the Sre Language
A Study of Paternalistic Authority in Vietnamese Culture
Attitudes of the Vietnamese toward Their War Disabled
Comparison of Military Elites in the Economic Development of South Vietnam and South Korea
Grammatical Analysis/Description of Rengao
Development of Sectarianism in Caodaism
Vietnamese Modern Musical Theater.

Information Resources The Vietnam and Southeast Asia collection in the University's Morris Library is steadily expanding and includes materials in English, French, Vietnamese and Chinese. Some hundreds of rolls of microfilm are also maintained with the collection. Acquisition listings and other information about the collection may be addressed either to the Morris Library or to the Center.

The Center also publishes an extensive bibliography of books, periodical articles and public documents relating to Vietnam.

Other publishing plans of the Center include a scholarly journal, *Southeast Asia: An International Quarterly*, a Newsletter, and

scholarly works on Vietnamese life and language.

Consulting Services The University's experience in Vietnam and Southeast Asia has already been indicated. The Center for Vietnam Studies is also

prepared to provide resources in personnel, materials and facilities including translation for conferences, symposia and workshops of Vietnamese and American scholars discussing common interest and problems. Specific inquiries should be addressed to the Director of the Center.

INSTITUTIONAL MODERNIZATION FOR DEMOCRATIC DEVELOPMENT TUFTS UNIVERSITY

Grant Program Director: Dr. Robert West
Director of International Development Studies
Fletcher School of Law and Diplomacy
Tufts University
Medford, Massachusetts 02155

Departments involved: International Development Studies Program, involving the disciplines of economics, political science, international law and organization.

The original objectives of the 211(d) grant program of the Fletcher School of Law and Diplomacy were specifically related to Title IX of the Foreign Assistance Act which states that "emphasis shall be placed on assuring maximum participation in the task of economic development on the part of the people of developing countries, through the encouragement of democratic private and local governmental institutions." The implications of Title IX are multiform and far-reaching, and the grant program at the Fletcher School has evolved, consonant with the School's interests and capabilities, in somewhat more encompassing directions.

The grant is directed to the School's International Development Studies Program, which was originally organized in early 1967. It was initiated with Ford Foundation grant funds which have continued, and has received support from a number of small foundations for specific purposes, as well as from 211(d) sources. The 211(d) funds were awarded for the purpose of developing capabilities in the area of "Institutional Modernization for Democratic Development." At AID/Washington the grant is monitored by

the Civic Participation Division, Office of Policy Development and Analysis, Bureau for Program and Policy Coordination.

As a whole, the Program is an interdisciplinary activity carried out by a group of economists, lawyers, and political scientists, together with a number of junior scholars, to improve insights, measures, correlations, and analytical frameworks on the major problems of development and modernization.

The Fletcher School of Law and Diplomacy is administered by Tufts University in cooperation with Harvard University. Cross-registration in courses offered in the various graduate and professional schools of Tufts and Harvard is open to participants in the International Development Studies Program, and research libraries of both institutions are utilized. In addition to the IDS program, the Fletcher School also administers a Law and Diplomacy Program assisted by AID. The Latin American Teaching Fellowships Program, which operates in about fifty universities in nine Latin American countries, has a cooperative exchange arrangement with l'Institut Universitaire de Hautes Etudes Internationales at the University of Geneva and with the Institute of International Relations of the University of the West Indies at Trinidad, (the Edward R. Murrow Center of Public Diplomacy).

Instructional Resources The International Development Studies Program curriculum provides for instruction and research leading to a Master of Arts in Law and Diplomacy. It is a two-year program which normally includes about six months of internship study and research abroad. In addition, the Program also offers a special one-time, one-year program in political development for AID mid-career officers. Those who complete these programs may, of course, proceed to additional advanced studies leading to the Ph.D. degree.

The intensive instructional activities of the Program require that it be limited to eighteen graduate students per year, although the number of applications for the Program far exceeds that total.

Altogether about forty graduate courses of the Fletcher School pertain to international development (out of a total of more than seventy). The academic program is divided into four Divisions--International Economic Relations, Political Institutions and Systems, International Law and Organization, and Diplomatic History and International Political Relations, and a degree candidate must undertake work in three of the four.

The total range of course instruction cannot, of course, be included here, but some indication of the instructional content of the program may be illustrated by listing the following recent additions to the normal instructional program, several of which have been presented by Visiting Research Associates:

- Law and Development (Law Division)
- Methods of Comparative Economic Analysis (Economics)
- Methods of Comparative Analysis of Political Systems (Politics)
- Comparative Economic Analysis: Seminar on Non-Orthodox Views of Capitalist development in the Third World (Economics)
- Seminar on International Technological Transfer and Economic Development (Economics)
- Intercultural Communications (Diplomacy).

A new phase of the instructional component of the IDS Program is currently being explored in cooperation with the Heller School of Social Work of Brandeis University, examining the possibility of joint course offerings in the development of social policy of less developed countries. Such topics as health and welfare administration, unemployment insurance, social security, population control, and housing authorities are considered relevant to the design of a comparative field of social welfare studies.

Special emphasis has been placed on the field of Law and Development, an area which has been expanded to three courses, including an examination of municipal law and domestic institutions to complement subject matter in international law.

In the academic years beginning in September 1969 and 1970 the IDS Program formulated year-long Title IX - Civic Participation training of mid-career AID officers. They were integrated into the regular course structure of the School, except for a special seminar concerned with integrating theoretical material with the applied operational material of their field experiences. Hereafter, however, AID mid-career officers will be admitted in the same way as other Fletcher students and will follow a course of study best adapted to their individual needs. Tuition scholarships and full fellowships are awarded on a competitive basis to U.S. and foreign students for international development studies. Accepted foreign students are handled on an individual basis, with assistance being given as deemed necessary.

For students accepted into the Program, the May-October research assignment abroad is an integral part of their study program. In recent years such research assignments have been made to Nigeria, the Congo, Ghana, Rwanda, Ethiopia, and Tunisia; to India, Thailand, Singapore, the Philippines, and Japan; and to Panama, Colombia, Peru, and Trinidad. The subject of research are selected so as to contribute to the research goals of the Program and to generate future teaching materials and case studies (see under "Research Resources" below).

Personnel involved in the Program for International Development Studies currently includes five senior faculty members, one of whom serves as Director of the IDS Program and another as Research Coordinator. The Program also has an Administrative Director. Working with the senior faculty staff are four Research Associates and three Consultants.

Research Resources Research activity in the IDS Program concentrates on questions of political, economic, and social development and modernization, and, more specifically, on the interrelationship of external assistance to change, growth, and development.

Four clusters of research activity have particular concern for the totality of the Program. One is the relationship between the political and economic systems of developing countries and their change over time, as a means of assessing development efforts and guiding external development assistance programs. The second research cluster concentrates on civic development, the interplay between civic awareness of responsibility and popular participation in the process of political development which, among other results, led to the preparation of a paper for AID on civic education. A third research area centers on multinational (regional or international) cooperative assistance as a coordinate channel of development efforts, including studies of the Mekong Basin development scheme and regional development cooperation in Africa. The fourth area of research focuses on the role of law and lawyers in the development process and in institutional modernization; research here has led to field investigations in seven countries: Ethiopia, Uganda, Tanzania, India, Malaysia, Singapore, and Indonesia.

Staff research activities have led to the publication of various books, including the following titles:

Latin American Politics: A Primer (Boston 1971)

Burma and Pakistan: A comparative Study of Development (New York 1971)

Reform and Revolution: Readings in Latin American Politics (Boston 1969)

Ghana's Foreign Policy 1957-1966: Diplomacy, Ideology and the New State (Princeton University Press 1969)

In addition to these works, a number of papers produced by scholars associated with the program have appeared in scholarly journals and other publications.

Graduate overseas internship research, for which research fellowships are granted to students for covering transportation costs and partial living expense, has produced a variety of research papers which are then utilized in future instruction. Topics have included the following:

Labor Force Formation and Employment in Ghana, 1956-1968

Student Politics, Higher Education and Political Change in the Philippines

Community Development and the National Agricultural Policies: The Case of Colombia

The Contribution of the Community Development Program in the Extension Service to Agricultural Development at the Bloc-Leval in the Gujarat State of India

Educational Community Development in Peru

The Philippine Sugar Industry in Philippine-American Relations

Panama: Reform, 'Revolution' and the New Militarists

An Analysis of Public Housing in Singapore

Nation-Building in Nigeria: The Consequences of the Civil War on Political and Social Development.

Specific inter-institutional research arrangements are presently being developed with the National University of Zaire in Kinshasa (Congo) and with Haile Selassie University in Addis Adaba, Ethiopia. Collaborative arrangements with other research institutes and universities in developing countries are generally encouraged and welcomed.

Information Resources Specialized collections of materials relating to the interests of the IDS Program are extensive. Special effort has been made to concentrate on the literature relating to political, social and economic development. Resource materials are, of course, available either at the Fletcher School library or by special arrangement with the Harvard University library collections.

Lists of publications prepared in connection with the IDS Program are prepared annually and are available on request; these include various unpublished papers as well. Much of the research implemented by the Program is just now in the process of being prepared for duplication and publication. The Fletcher School maintains a reprint series, but a final decision regarding the dissemination of completed research has not been reached. Dissemination has, however, proceeded within AID, both through the Civic Participation Division and through AID mid-career officers who have been assigned to the Fletcher School.

Consulting Services Consultative work by professional staff attached to the Program has been largely committed to AID, to the Institute of International Studies in Geneva and the Institute of International Relations of the University of the West Indies, and to the Inter-American Social Development Institute (ISDI). Institutional consultation, however, has been extended also to several institutions in West Africa which are contemplating the establishment of development studies and institutes.

The Program has provided consultants to AID on (a) community development in the Dominican Republic for two consecutive years, (b) to the Bureau of Program and Planning Coordination on multilateral aid and law, and (c) to the Africa Bureau on economic, political and institutional development questions. The specialized subject areas and interests of the professional staff as reflected in its consulting assignments have included the following:

- Civic education
- Community development
- Rural development
- Political development
- Economic development
- Management training
- Development of research institutes
- Coordination of information resources in Africa
- Law and development
- Curriculum and research development for overseas universities.

The six members of the professional staff (senior faculty and the Administrative Director) are available for contractual consultation in the following subject areas:

1. Political development and civic education, Latin America
2. International law, law and development, multi-national aid: Asia and Africa
3. Political development, Africa
4. International politics, foreign policy: Africa and Southeast Asia
5. Development economics, Africa
6. Political development, Latin America.

EXPORT DEVELOPMENT PACE UNIVERSITY

Grant Program Director: Dr. Thomas P. Robinson, Dean
Graduate School, Pace University
Pace Plaza, New York, New York 10038

Department Involved: Graduate School

Developing countries are impeded in their processes of growth by a lack of foreign

exchange, and by the growing volume of debts which become increasingly difficult to service. If expansion of their export potential could be effected, foreign exchange would be

generated and funds for the servicing of debts much more readily available.

A 211(d) grant therefore, was initiated to improve the capability of Pace University to work on problems of export development in less developed countries. Particularly because of its location in downtown Manhattan, the Graduate School of Pace University has easy access to people who are practically engaged in international trade and finance, a positive advantage for undertaking training and research in the export development field.

Instructional Resources Pace University provides instruction leading to undergraduate and graduate degrees. The Graduate School offers degrees in Professional Studies, Business Administration, Arts, Science in Education, Applied Science, etc.

The Graduate School is located in New York City, an ideal location for obtaining ready counsel and general support for nearby banks, insurance companies, headquarters of major national and multi-nation corporations, the World Trade Center, a new "Civic Center", the stock exchanges and a long list of supporting ancillary businesses. United Nations headquarters is nearby.

This location and the ties which have ensued, enrich the classroom curricula with contracts of "practical application" which are most important to LDC students who are studying subjects useful to development processes in their homelands.

An International Business Program of the school is currently expanded into a new creation—an Institute of International Business which is now an integral part of Pace's Graduate School. Establishing this Institute (encouraged by the 211(d) grant) called upon the experience and competency of the University in business education. The faculty and administration feel that particular emphasis is to be placed on providing students with fundamental concepts that serve as a foundation for effective performance in any geographic area. The important international ingredient is superimposed on this foundation in order to stress the different problems faced by individuals from less developed countries.

The Graduate School makes special provisions to meet the needs of particular segments of the educational market. For example, an Executive M.B.A. program is tailored to an eight month academic year offering classes to 92 senior executives on alternate Fridays and Saturdays. This permits concentrated instruction while not seriously disturbing the student's on-the-job contribution. In such cases, students are usually company sponsored.

The International Business Faculty includes an impressive roster of accomplished professionals in such fields as Economics, International Business, Management, Marketing, Accounting, Economics, and Finance, and Taxation.

The Graduate School offers offices, classrooms and auditorium space for faculty, students, staff consultants, special seminars, conferences and other such activities to the 211(d) grant program. Also included is the use of library and reference facilities, access to computer facilities and other portions of the college as deemed appropriate.

One of the program's targets is the establishing of linkages with overseas institutions identified as pursuing problems of common interest. The Graduate School welcomes applications from college or university graduates from other countries, but advises that at least four month's lead time is requisite in filing applications for admission.

The activities of the institute also includes an executive program and a Masters degree program, both in Export Development and the build up of a document repository of literature relevant to the economic structure of LDCs. The Institute works closely with business corporations and other institutions (i.e., United Nations and the World Trade Institute) in the New York area—in pursuit of its various objectives.

Research Resources As one of the program's priorities is to conduct research on problems of export development, the past experience of Pace University's faculty must prove invaluable to the challenges posed by the grant. The 250 faculty members have demonstrated their

capacity for research of a global nature, many having completed projects in Asia, Africa, the Middle East, Latin America and the Caribbean. The International Business Institute calls upon such individuals to serve as adjunct faculty. The broad experience of the faculty in various communities enables the training of students with on-the-job programs which include visits to the banking community, commodity exchanges, wholesale houses, grading companies, produce centers and department stores. Such training is an integral part of both training and research programs.

The Graduate School has sponsored such international business conferences as "International Business", "Nationalism and Integration in Latin America", "Business in the Oil Producing Countries of the Middle East and North Africa" and "Japan: Challenges and Opportunities". Such conferences reflect the theatres of research to which the faculty has so much addressed itself.

Linkage ties with the World Trade Institute provides additional trade laboratories to continue research along "practical application" lines.

Information Resources The establishment and operations of a new Document Center will have garnered a massive collection of materials pertinent to the program. The Pace Library services the needs of students with a constantly growing collection of books, periodical titles, annual reports, and an extensive file of information pamphlets. The library, monitored by a professional library staff is located at the New York campus of the College in the new Civic Center complex. It holds 140,000 volumes, 850 periodical titles and a file of annual reports for over 2,000 corporations. The use of the library and reference facilities, special equipment and computer facilities, and other portions of the college deemed contributory to the objectives of the 211(d) grant program are available to students and faculty.

Consulting Services The Graduate School offers to the program the consultation and participation of faculty

members even those not directly supported by the grant. Also, the School makes special effort to bring consultants from throughout the world to participate in research and training programs. Pace University is well equipped in its present capacity to provide qualified advisors in the Export Development field of activity advisors who can conjoin knowledge of economics, international finance, marketing and expertise in the needs and strengths of the LDCs. Through such advisors, the varied aspects, strategies and organizational requirements necessary to mount comprehensive export programs in such countries, can be readily determined.

Consultants and faculty must study and derive key concepts necessary for developing export earnings in LDCs, thereby achieving an advisory resource useful to A.I.D. and other interested organizations as well as to private businesses and governments of LDCs.

At this time of reporting, less than a year has elapsed since the signing of the 211(d) grant agreement, and this is an insufficient interlude to offer substantive data on progress in the build-up of resources in final form. However, it is presently known that the Institute of International Business has been set up and introduced as a permanent component of the graduate school of Pace University, that the implementation schedule of the program is being met, and that linkages are being formed with the World Trade Institute, the educational arm of the Port Authority of New York and New Jersey which has likewise received a grant from A.I.D. to enable it to build up its institutional capability to assist LDCs in export development. It concentrates on the practical aspects of the program, conducting training courses establishing trade laboratories, providing consultants and experts, and in general, advising LDCs upon request, on export development policies and on the organization of local support institutions.

This linkage provides an additional measure of "practical application" to a large part of the 211(d) program's concentration on "key concepts".

Educational Development

These educational grant programs are concerned with what many feel is one of the most basic ingredients of the development process—the reformulation of educational systems for low-income countries. All programs are multidisciplinary, but each is concerned with objectives and processes of different character.

University	Field of Technical Concentration
University of California Los Angeles	Develop instruments for analysis of alternatives to traditional educational processes
Florida State University	Planning, design and implementation of educational technology
Stanford University	Low-cost uses of mass communication technologies
University of California Berkeley	Economics and finances of education
University of Massachusetts	Nonformal approaches to education

To increase competence identified in the fields of technical concentration listed above will require that significant breakthroughs be found. If the gap between education needs and educational resources is to be narrowed innovative devices and procedures must be found which will enable traditional systems to develop some novel departures. Illustrative of the interests being pursued by these universities are these: isolation and examination of socio-cultural considerations in education and development; learning systems that can provide useful education and training for large numbers of people at costs anticipated budgets can manage; systems analysis in education.

These grants with the exception of the University of California, Los Angeles, are managed in AID/Washington by the Office of Education and Human Resources, Bureau for Technical Assistance. The University of California, Los Angeles, grant is managed by the Office of Development Resources, Bureau for Latin America.

**ALTERNATIVES TO TRADITIONAL EDUCATION
UNIVERSITY OF CALIFORNIA, LOS ANGELES**

Grant Program Director: Dr. Thomas J. LaBelle
Coordinator for Research on Latin American Education
Graduate School of Education
Latin American Center
UCLA
Los Angeles, California 90024

Departments Involved: The Latin American Center is organized around eight Deans' Advisory Committees comprising 50 faculty members representing eight schools and colleges.

Grant-supported activities through UCLA's Latin American Center are focused on "the development of multi-disciplinary competence for analysis of effective alternatives to processes of traditional education". The program is designed to strengthen interdisciplinary research, training and service capabilities as they relate to the role and function of education in the development process in Latin America. Specific objectives of the program include:

1. To develop instruments and procedures for analysis of alternatives to traditional educational processes and, within the financial possibilities of the grant, to collect, analyze and interpret aggregate data from (a) sub-national and (b) national levels of selected educational problems.
2. Isolation and examination of socio-cultural considerations in education and development,
3. Investigation of economic aspects of education in the development process,
4. Examination of systems of educational technology as they relate to educational productivity,
5. To relate rural-urban considerations to the process of educational development, and
6. Support of research and training for students and professional staff of domestic and foreign agencies through

seminars, symposia, and regular University course work.

The various Deans' Advisory Committees, as well as the Grant Coordinators' Committee are all actively involved in the program. Through them faculty and students carry out studies of a wide variety, including those to assess the impact of the family and the out-of-school learning environment; various components which characterize the operation of schools (administration, teaching, curriculum planning and reform); and the relationship of both institutional and noninstitutional schooling to the development process, as well as alternatives to traditional processes of formal education.

Instructional Resources The University's School of Education offers a doctoral program in Comparative and International Education. Two graduate courses dealing specifically with education in Latin America have been developed. One is an introductory course which surveys the role and function of schooling in Latin America; it surveys the cultural, economic, and political institutions of the region as they relate to an understanding of the educational systems used.

The other is a seminar on educational problems and issues of Latin America, which is designed to give students an opportunity to study recent research on Latin American education, pursue the preparation of research proposals prior to conducting their own research in Latin America, and analyze and present their research findings. The seminar is offered in the fall and spring quarters, thus encouraging students to undertake their field

research in the summer and winter and then return to campus the following quarter to participate in the seminar and report their results.

In confronting its task, the Latin American Center instituted curriculum reforms in both its B.A. and M.A. programs. In addition to encouraging students to take courses outside of the traditional Latin American studies area while applying theoretical and methodological principles to Latin American topics, students are able to spend a portion of their careers in Latin America. Masters' students may select either a comprehensive examination or thesis plan in completing their degrees.

Many different courses relating to development are offered through the Schools of Law, Engineering, Public Health, Education, and Social Welfare, and through the Departments of Anthropology, Sociology, Psychology, Economics, History, Political Science, and Linguistics. These course offerings provide the necessary theoretical and methodological approaches which guide student research and evaluation in their studies pertaining to education and development in Latin America.

Special seminars in the subject area draw upon visiting U.S. and foreign scholars expert in Latin American problems. These "standing seminars" are attended by both faculty and students as well as by invited specialists. A major conference on education and development was held during the 1972-1973 academic year which brought together specialists from the Americas. Among other objectives, it served as a clearinghouse for research completed through the grant program.

Several non-degree short-courses have been and will continue to be conducted by the UCLA Center in Latin America. On three separate occasions week-long workshops on the institutionalization of change in higher education have been held in Mexico and Venezuela. Both U.S. and foreign students may enroll at UCLA as non-degree Latin American Studies majors; USIS and USAID personnel have taken advantage of this opportunity.

Fellowships and scholarships for both U.S. and foreign students are available from a number of sources, including:

NDEA Title IV
Ford Foundation
National Science Foundation
UCLA Research Assistantships
UCLA Teaching Assistantships
California State Scholarships
Danforth Foundation Fellowships
Foreign Area Fellowships
Woodrow Wilson Dissertation Fellowships
Fulbright-Hays Grant for Graduate Study
OAS Fellowships

Special resources available to foreign students include special English courses, a foreign students' office, and International Student Center, and several student organizations representing different countries and regions.

Resources available for assisting study programs include a full-time statistician-research-computer programmer to help in the preparation and editing of empirical research studies emanating from the Latin American Center; and a Latin American Bibliographer and assistant in the University Research Library. In addition to other Center staff, a part-time editor handles publications while others specialize in planning and conducting seminars and advising on Latin American education.

Research Resources Applicable research resources at UCLA include a system of rapid access to statistical information on Latin America which is published annually by the Center and is now on computer tape, entitled *Statistical Abstract of Latin America*. In fact, UCLA maintains one of the largest computer networks of any university campus in the world. Another research asset is the ERIC clearinghouse on Junior College Education, as well as the Center for the Study of Evaluation, both of which are housed in the School of Education. Data assembled from six years of University partic-

ipation in the Ford Foundation's Chile-California project conducted with assistance from the Latin American Center add additional research assets, along with UCLA's notable library collection on Latin America.

The Grant Coordinators' Committee reviews and funds research proposals submitted by UCLA students and faculty to pursue investigations relating to education and development in Latin America. Those interested in the nature of the grants may write to the Center for a copy of its report, entitled, *Development of Special Multidisciplinary Competence for Analysis of Effective Alternatives to Process of Traditional Education*.

Arrangements for receiving UCLA students and faculty as colleagues in Latin American institutions have been established in Mexico, Guatemala, Costa Rica, Panama, Venezuela, Peru, and Brazil. Students and faculty are also able to take advantage of the Centro Latino Americano de Venezuela, a special institution created ten years ago to bring together UCLA's Latin American Center with a large number of Venezuelan institutions.

UCLA welcomes collaborative research arrangements with institutions throughout Latin America, and is interested in providing staff and material support for pursuing the interests indicated by the host country institution. Arrangements of this kind have been established with the Simon Bolivar University and the National University of Caracas, the National University of Mexico, the Catholic University of Rio de Janeiro, and others.

In addition to research publications and unpublished theses by graduate students, a large number of publications relative to the subject area have been and are being produced by UCLA faculty. The list is too lengthy to include in this Directory, but lists and information about these publications may be obtained from the Latin American Center. The aforementioned *Statistical Abstract of Latin America* has been published annual since 1966.

Information Resources A special library collection of books, periodicals, and government reports relating to both education and development in Latin America is a coordinated project of the University Research Library and the Education/Psychology Library. The collection resulted from an intensive survey of the literature made during the 1970-71 academic year.

The Latin American Center can supply bibliographies on special topics in education to AID personnel. Other individuals interested in securing material are invited to request them through interlibrary loans or by direct request to the Latin American Bibliographer at the University Research Library.

Consulting Services Much of the consulting activity of the Latin American Center has taken the form of inter-institutional relationships as described above. These arrangements include both Latin American universities and certain private foundations in Venezuela and Mexico.

In addition to the many graduate students and research assistants connected with the work of the Center, nearly eighty faculty members of UCLA have a particular interest in Latin American studies. They are associated in an advisory capacity to the Center and are teaching courses relating to Latin America; the majority of these faculty members are currently involved in research in Latin America.

Their specialities include Latin American arts, theatre, music and literature; public health, nutrition, and medical care; urban planning; political science; anthropology; comparative education and educational planning; law and land reform; cultural history and Indian languages; engineering; economic development, statistics, business management, etc. Both short- and long-term consulting assignments are encouraged, either as individuals or in interdisciplinary and specialist teams.

**EDUCATIONAL TECHNOLOGY
FLORIDA STATE UNIVERSITY**

Grant Program Directors Dr. Robert M. Morgan
Dr. Robert K. Branson
Center for Educational Technology
Florida State University, Florida 32301

Department Involved: Center for Educational Technology, a multidisciplinary organ associated with the University's College of Education.

The educational technology program of the University's College of Education is designed, using a systems approach, to strengthen the following areas of competency:

1. Planning, design, and implementation of complex instructional systems.
2. Educational measurement and evaluation.
3. Design and development of multimedia and self-instructional materials.
4. Planning, design, and implementation of educational management systems, and
5. Planning for instructional facilities and the allocation of educational resources.

The University's capabilities in educational technology are concentrated in an integrated, multidisciplinary Center for Educational Technology (CET). The 211(d) grant program of CET is primarily for the purpose of developing the institution's capabilities for extending the competencies enumerated above for application to the educational needs of developing countries.

Instructional Resources Two major types of training are being developed to prepare students for service to that objective: the regular graduate program leading to master's or doctoral degrees, and non-degree programs consisting of specialized courses and workshops.

In the graduate program, students can major in the following areas of concentration:

1. Educational evaluation and measurement,
2. Instructional systems development, or
3. Educational psychology

All the above fields are represented in the Department of Educational Research and Testing. Or the student can concentrate in the following studies within the Department of Educational Administration.

4. General administration,
5. Financing Economics,
6. School planning and management
7. Supervision and curriculum,
8. Personnel administration, or
9. Systems analysis.

It is, of course, possible that a student may wish to major in other areas (e.g., sociology, psychology, adult education, science education, industrial arts and vocational education, international education, social studies education, habilitative sciences, or economics) while at the same time carrying a strong minor in educational technology.

The graduate degree programs are flexibly arranged so as to address the particular needs of qualified students. Appropriate and relevant practical experience is built into these programs.

Non-degree programs are arranged for those who require practical training and experience, but who are not pursuing a degree program. Longer-term students can have a planned program which includes a selection of courses for periods of from one quarter to a full academic year. Also available are short-term programs that include special purpose short-courses, workshops, and institutes in educational technology. They may vary in length from a

few days to several months. Content is tailored to the background level and needs of the participants. CET currently provides such programs to train people in the development, implementation, and evaluation of instructional systems, specialized and non-formal educational programs, and multimedia programmed instruction materials. Such non-degree short-term programs can be administered either on or off campus. Notable examples of off-campus programs include those conducted in conjunction with host country personnel in Korea and Panama.

All of the programs described in the foregoing are available to both U.S. and foreign applicants. The majority of foreign students engaged in CET programs are funded by projects or participant traineeships. Further information may be obtained by writing the Director, Center for Educational Technology. Applicants should cite the source of information when they apply.

Research Resources Analytical and applied developmental research projects are a key part of the Center's program. Most of these projects are directed systematically at finding ways of increasing instructional efficiency at feasible cost. Alternative instructional plans are designed and field tested for different conditions, resources, and constraints unique to various countries and regions. The research program aims to develop rational educational systems consisting of alternate mixes of components after careful study, singly and in combination, of their relevance to a given country or region. A major research function of the Center is the analysis and evaluation of the way these elements are organized within the developing country, and alternate ways in which they could be made more effective.

Toward this end, CET is actively engaged in promoting interinstitutional research arrangements. Institutions with which the Center has already begun to collaborate include the Instituto Nacional de Pesquisas Espaciais (INPE) in Brazil; the National University of Zaire; and the Korean Institute for Research in the Behavioral Sciences (KIRBS). Negotiations are underway with other institutions in

these regions as well as in Latin America, the Near East, and South Asia.

Research and experimental resources available at the Tallahassee campus include the Computer Assisted Instruction Center, the ITV Studio, the Computing Center (which has a CDC 6500 with numerous terminals), the Film Media Center (with the Southeast Film Depository), the University Radio Station, and an educational television station. The Division of Instructional Research and Service provides evaluation services, media services on and off campus, production services, and an instructional development center.

Wherever feasible and appropriate, research and planning studies are conducted in actual developing country educational environments and in cooperation with host country institutions and agencies serving as co-researchers.

Informational Resources The University is currently in the process of developing a special library of reference materials, books, and research reports on educational technology and its application to developing countries.

CET's Technical Information and Materials Section (TIMS) disseminates relevant information on programs and projects which should be useful to educators, planners, and governments of developing countries. Concise, annotated bibliographies on educational radio and TV, programmed instruction, education for minorities, non-formal education, and vocational education are presently being developed. Inquiries should be addressed to the attention of TIMS at the Center.

Consulting Services Florida State University has an extensive roster of professional personnel experienced in the numerous and varied aspects of educational technology. The University encourages consulting and collaborative arrangements. The professional resources available for application to problems and prospects in developing countries are integrated through the Center, and are available to institutions, agencies and governments interested in applying these resources to bringing about educational development and change.

**COMMUNICATION AS RELATED TO EDUCATION
AND HUMAN RESOURCE DEVELOPMENT
STANFORD UNIVERSITY**

Grant Program Director: Dr. Nathan Maccoby
Department of Communication
Cypress Hall, Stanford University
Stanford, California 94305

Departments Involved: Institute for Communication Research (Program in Communication Media and Social Change)

Although developing countries have made significant progress in education during the past decade, most of their school-age youth still are not receiving any formal education. This fact points up the need to establish learning systems that can provide useful education and training to a much larger number of people at costs anticipated budgets can manage.

Evidently formal education alone can't meet the challenge. It takes too much time and money, indicating that non-formal and out-of-school approaches must be explored. Efforts to focus to low-cost uses of communication technologies are a thrust of this program.

Today's emphasis is directed to the design and development of educational systems which can reach the poor, rural, in-school and out-of-school populations with information directly related to their quality of living. Planning, skilled evaluation and advanced training are needed to make new communication techniques work for all segments of society.

Instructional Resources At present there is a critical shortage of people who are knowledgeable about the field of communications as it applies to international development needs. Therefore, Stanford University is initiating a graduate training program in international communications that includes both Ph.D. and M.A. level studies. Students will be encouraged to add special interest studies such as psychology, education, economics, sociology and engineering to

the foundation courses in theory and research methods in communications.

The doctoral program will be limited to those individuals who need thorough research training and who can afford to spend four to five years preparing for work in the LDCs or in international development agencies. By contrast, for the majority of degree candidates from LDCs who cannot afford the time and who do not seek such a high level of training, a specially tailored two year M.A. program is available.

The new Master's program entails a two year commitment on the part of most students. In the first year, students undertake intensive work on communication and development theory, statistics and research methods. Opportunity for study in areas of individual interest are also provided. In the second year, each student designs and carries out a field research project, returning to Stanford to analyze and report his findings in the form of a Master's thesis, and where necessary takes additional course work. The following core courses are sample offering from the Department of Communication and other departments of the University:

Theory of Communication
Communication Media and Social Change
Communication Research Methods
Evaluation Methods for Mass Media Projects
Statistics

Sample elective courses:

Comparative Ideologies and Education
Telecommunications Systems & Public Policy
Persuasive Communication

Education and Socio-Cultural Change
Education and Political Development
Social Psychology of Modernization
Economics of Underdevelopment
Non-formal Education
Analytical Techniques for Development
Planning
Survey Design and Analysis
Introduction to Test Theory
Introduction to Computing

While admission guidelines are not rigid, it is expected that the program will be of most value to candidates from Asian, African and Latin American countries who are presently engaged in communication projects or who are affiliated with agencies or institutions sponsoring communication research. Previous experience, while not required, will improve a candidate's chances for acceptance. Competence in English is required. The Department warns that application should be completed well in advance of the courses.

The Department of Communication does provide some financial assistance to supplement funds that the candidate can mobilize from sources such as bi-national or multinational agencies, foundations, or local institutions. Such assistance does not exceed the cost of full tuition and a modest contribution towards the maintenance of the candidate at Stanford.

For correspondence and information, write to:

Program in Communication Media
& Social Change
Institute for Communication Research
Cypress Hall
Stanford University
Stanford, California 94305

Research Resources Three basic strategies are employed in Stanford's plans to increase knowledge of instructional/informational technologies. They are: synthesis and interpretation of existing data; a program of research development and evaluation; and encouragement of top scholars to

concentrate on problems of the field for varying periods of time.

In the area of synthesis and interpretation of existing data, efforts focus on defining the generalizability and implications of the already existing body of research, making the results of such work available for policy and planning purposes.

Field research of the Institute is turning from macro to micro studies, from an attempt to understand broadly the function of communication in development and the general problems of introducing new technologies in traditional cultures, to the more sharply targeted studies on how communication works and how it can be used most cost-efficiently for a given purpose in a given situation.

Research methodology expects to make the results of pilot studies increasingly applicable to large scale projects.

Through the 211(d) grant, Stanford University has an opportunity to strengthen its competence in research, training and technical assistance in the area of communication and human development. The grant enables Stanford to build upon its core of communication specialists who have intimate LDC experience and second language capabilities. It allows the Institute of Communication Research to expand its knowledge and skill in field evaluation and in cross-national research and measurement by involving other kinds of disciplines in a more comprehensive approach to the task—such disciplines as anthropology, psychology, economics, etc. Research on the development of new cost-effective approaches to providing information, data and knowledge suited directly to the needs of LDC populations is the most challenging aspect of the program, particularly when it is directed at those who have always been passed by traditional education programs.

Such attention is being given to the infusion of relevant research findings and innovative thinking into the planning of those who have the responsibility for decision-making in the LDCs.

The Institute for Communication Research is an integral part of the University's highly regarded Department of Communication. In recent years, its work has taken on new significance in LDCs because of its strong specialization in instructional/informational technologies in LDCs. Through A.I.D. supported projects it has worked on television and its lower-cost alternatives, and evaluated the El Salvador educational reform program.

The Institute also has ongoing projects concerning the role of media in influencing change in health practices, problems of diffusion of information and knowledge utilization, delivery of health care to remote areas, telecommunications policy-particularly relating to satellite and cable technology the social and learning effects of the media on children, and the political and institutional context of the media.

Information Resources Library facilities including access to the Stanford ERIC System, and to information storage and retrieval systems, and techniques (principally SPIRES) developed by faculty members of the Department of Communication are made available to the program as a condition of the grant.

Stanford increases its knowledge about communication and educational technology by exchanges with centers at other universities and institutions. The Institute also draws upon other units of the Department (such as Broadcasting and Film) for increasing the information resources at its command.

Consulting Services In direct support of the grant, Stanford provides active participation of faculty members of the Department of Communication, whether or not they are directly involved in the program itself, in planning and carrying out the activities described in the grant.

Contributions from scholars and professionals from outside the Institute (for example, Florida State University) are sought chiefly in two ways. Through meetings, brief seminars, residency at the Institute, etc., these consultants are invited to contribute to efforts at synthesis, to setting research priorities, and to solving difficult methodological problems. Secondly, collaboration with the East-West Center in Hawaii will result in, among other things, summer meetings which will explore many research problems considered germane to the fields of lower cost technologies and out-of-school populations.

The establishment of formal and informal links with scholars and research organizations in less developed countries (for example, the Center for Educational Studies in Mexico) is continuing, and should lead to joint research projects as well as an exchange of information and ideas.

The grant program at this time of reporting, has been initiated too recently to offer substantive data in full scale resources. However the very fact that a M.A. course has already been set up and advertised in proof that the "action" phases of the specific areas of concern charted by the grant will accelerate rapidly in subsequent years.

**PROGRAM IN INTERNATIONAL EDUCATION FINANCE
UNIVERSITY OF CALIFORNIA, BERKELEY**

Grant Program Director: Professor Guy Benveniste
Program in International Education Finance
School of Education
University of California
Berkeley, California 94720

Departments Involved: School of Education,
Program in International Education, Pro-

gram in Economics and Finance of
Education.

The University of California at Berkeley was selected as a 211(d) grant recipient to deal with research and training on cost, efficiency and finance of education factors in developing countries.

Despite large and rapidly growing investments in education, an increasing disparity between educational needs and educational resources persists. At the end of the decade of the 1960s the percentage of GNP invested in education by developing countries was comparable to that of the United States, Europe and the Soviet Union, and in terms of percentage of public budget, it was even higher.

Between 1960 and 1970, the developing countries have increased their public expenditures for education by roughly 117%. During the same period, their school enrollments increased by about 100%, but the percentage of school age children enrolled increased by less than 10%. At the end of the decade, more than half the population of these countries will have attended school, less than 30% will have gone to secondary schools, and less than 3% will have received higher education. Thus, despite many efforts to correct such disparities, the gap between educational needs and available resources continue to widen.

Instructional Resources The academic portion of the Program is an integral part of the normal activities of the Graduate School of Education at the University of California, Berkeley. The responsible academic unit within the School of Education is the Program in Economics and Finance of Education. Students joining this program are usually candidates for the master's or doctorate degree in Education. They apply for admission according to normal procedures of the University. In addition, informal arrangements have been made with the Business School, the departments of Computer Science, Industrial Engineering and Operations Research and Economics to facilitate admission to those departments for foreign students interested in the Program who, by reason of past training and specializa-

tion would logically be admitted to those departments.

Any applicant to the School of Education must be admitted to the Graduate Division. However there is a limitation on the number of students who may be admitted each quarter for graduate study on the Berkeley campus. Each program within the School of Education, therefore, operates on a quota basis, and students are urged to submit applications for admission and re-admission as early as possible. Contact the 211(d) grant officer for current procedural information.

Generally, applicants to the Graduate School of Education are admitted for the fall quarter (starting in late September or early October). Decisions on admission for the fall quarter are made in the Spring and completed applications must, therefore, be received beforehand. Applicants to this Program should have filed all forms and letters of recommendation before February 1 for admission in the fall. In other words, the admission process requires a one-year lead time.

The following courses are currently offered by the staff of the program:

- Finance and Economics of Education
- Costs and Finance in Education
- Advanced Seminar in Systems Analysis in Education
- Equity and Finance
- Advanced Personnel Administration in Public Education
- Seminar on Concepts and Theories of Leadership in Educational Administration
- Comparative Educational Administration
- The School in America
- Comparative Education (African emphasis)
- Selected Colloquia in Education

Attention is called to the "two-step Masters and PhD Program initiated several years ago at Berkeley. Foreign candidates for a master's degree spend two years at Berkeley during which time they complete work toward that degree. They return to their homelands for one or two years of service. Then they may

return to Berkeley to continue academic work toward a Ph D. When this work is completed they return to their countries to complete dissertations.

In addition to normal training programs, it is contemplated that special training activities such as short-term training seminars will be organized depending on demand.

The School of Education, and occasionally other professional schools and the College of Letters and Science, emphasize efforts to bridge the gap between theory and practice - that is, to train practical policy analysts. Quantitative assessments of alternate policy actions derive from a model of an educational system on computers.

A newly introduced M.A. course on Quantitative Techniques, Applied Economics, Finance of Education, Cost Analysis, Planning Models, Cross National Comparisons, Demography, Manpower Requirements, Cost Projections, Organizational Theory and Political Economy. Field trips are included.

The faculty in the School of Education dealing with International Education Finance includes some of the most knowledgeable consultants in this field. They are in close contact with educational finance programs developing at Harvard; the Educational Technology programs at Florida State University, UNESCO's International Institute of Educational Planning in Paris, World Bank and Stanford Research Institute. Many of the faculty staff have had considerable overseas experience.

Research Resources A number of consultants compose an embryonic nucleus of a Resource Panel of Advisors. The research program holds to the central purpose of inventing a set of practical analytical models that can be used by decision makers in cooperating countries to better manage the raising, distribution and control of educational resources. This is to be done with the cooperation of university and other research groups in the developing nations. The central purpose is being pursued by a multi-pronged attack at three levels:

First level: This is the development of practical macro models using data and computer facilities available in LDCs planning to improve existing macro policy instruments to better link decisions about education with an integrated view of other significant factors.

Second level: This level serves to expand theoretical thinking as back-up to the first stage. It studies the distributive consequences of the way resources for education are raised and allocated. Who pays for and who receives educational services? How do the various legal and social factors constrain the kinds of revenue raising that can be contemplated, and how do these affect the way education is paid for and used?

Third level: This level provides further back-up to the previous levels, but uses the experience to improve subsequent models. Efforts concentrate on the organizational dimensions of the problem. It studies in some detail why some systems of education in developing countries are more effective or even more efficient than others. What variables contribute to success? What is the role of informal education? How does one best resolve the issues of centralization or decentralization? What is the possibility of using schools as producing units? The third level represents a strategy of scanning and searching for new facts that can be made available to the model builders of levels one and two.

These projects involve the cooperative efforts of many countries: Bangladesh, Tunisia, Liberia, Ethiopia, Tanzania, Zaire, Ghana, and deal with studies centered on "Non-formal Education", "Functional Literacy", "Effects of Investments in Education versus Investments in Family Planning in Population Control", "Mathematical Programming in Education", "Education for Self-Reliance", "Educational Organization for the Future", etc., etc.

The research program, therefore, seeks to establish working relations with selected universities or research centers in developing

countries desirous of participating in joint research and/or training activities. Results from joint research projects will be published in the host country by the cooperating organizations, and where appropriate the results will also be published by the Program and distributed to other countries.

Information Resources The Program Library is in contact with many research groups in developing countries. The library appraises cooperating institutions of acquisitions in its collection via a monthly acquisitions list. Where possible, copies of specialized materials, unavailable elsewhere, will be supplied upon request to cooperating libraries in developing countries. Exchanges of publications are encouraged. Interested persons should write to the Head Librarian, Program in International Education Finance Library, I.G.S. Library, 109 Moses Hall, University of California, Berkeley, California 94720 U.S.A., or make contact through the 211(d) grant officer listed above.

The Library has contacted 53 governmental agencies, private associations and research organizations throughout the world 26 in the Western world and 27 in non-Western nations. As contact is made with more and more agencies, reciprocal exchange programs of publications and bibliographic information are expected to increase significantly.

Library cooperation is appended with other cooperative arrangements such as one for exchanges of personnel especially important where joint research programs are underway. Also, conferences, workshops, short term training etc., can very often be arranged when mutually beneficial. This, too, is significant where joint research projects have been initiated and research results from one country can be generalized.

Consultant Services A core staff was brought together at the Program in International Education Finance unit of the University of California at Berkeley during its first six months of formation. Some members came from the existing faculty at Berkeley. Others were hired under

the 211(d) grant. Appointments were monitored by the need to gather the various professions desired, tempered by significant experience. Economists, systems analysts, sociologists, political scientists, historians and administrators were gathered. Special effort was made to include persons with considerable practical knowledge of education in developing countries, mixing younger staff members with more seasoned experts. The intent is not to create a permanent staff. In time, it is hoped that the group will include members of cooperating institutions working on common problems, some joining the Berkeley group and some working in developing countries. The long run objective is to augment the world pool of talent in this field. Their areas of interest include:

- Organizational Efficiency and Implementation
- Application of Mathematical Models in the Analysis of Education
- Educational Finance and Equity plus the Relationships of Education Cost and Finance Questions to those in Nutrition Analytical Models for Use in Setting Education Finance Policies
- Problems of Equity in Education Finance and Cost, and Finance in Higher Education
- Statistics and Educational Planning
- Organizational and Educational Efficiency
- School Administration and Educational Effectiveness

Presently staff members are consulting in 11 overseas nations located in Asia, Africa and Latin America.

The group has authored many publications and articles, all of which hold some special significance to the Program.

Arrangements for enlisting the contribution of consultants must be made directly with the University:

Principal Investigator
Program in International Education
Finance
School of Education

University of California
Berkeley, California 94720

For information on training and admissions.
Chairman

Program in Economics and Finance
of Education
School of Education
University of California
Berkeley, California 94720

NON-FORMAL EDUCATION FOR THE DEVELOPING WORLD UNIVERSITY OF MASSACHUSETTS

Grant Program Director: Dr. David Evans
Center for International Education
University of Massachusetts
Amherst, Massachusetts 01002

Departments Involved: Center for International Education, School of Education, other departments of the University.

This new 211(d) grant will finance a program aimed at building the University of Massachusetts' competence in the broad area of nonformal education, with emphasis on the development and field testing of innovative approaches in less developed countries.

During the past six years, the School of Education at the University has been engaged in the formulation of new approaches to education which has brought it national recognition. The Center for International Education was created six years ago as one of the centers in the School of Education and now consists of a core group of about 35 people, both faculty and graduate students, resident at the Amherst campus. This group is supplemented by a network of about 15 people in locations around the world. The Center is engaged in activities which cluster around the following areas: curriculum development for international studies in the U.S., cross-cultural training, development of education in the third world, and nonformal educational approaches to development.

Based on the groundwork of current projects in nonformal education, the University will establish a Nonformal Education Center (NEC) within the framework of the existing Center for International Education. The two centers will form a mutually supportive team which will draw on the considerable resources

of the School of Education other departments within the University, and other institutions in the Five-College Consortium.

Instructional Resources The purpose of the grant is to increase the capability of the University of Massachusetts to assist developing countries collaboratively, particularly in rural areas, with development-oriented nonformal education programs. Such programs will include the promotion of skills and knowledge in family health and nutrition, agricultural productivity, literacy and numeracy, community and cooperative organizations, and other relevant areas.

Faculty, graduate students and associates of the University will be able to offer expertise in nonformal education theory and practice in the areas of training, research, materials development and delivery systems, and will maintain a network of human and materials resources involving domestic, LDC and international institutions.

Workshops and other training model options in specific nonformal education skills will be presented for various clientele. A course will be designed for nonformal education practitioners from LDCs and donor agencies. This course will emphasize the design of programs and materials for use in rural areas.

Research Resources Research will be conducted to the extent

possible in cooperation with an AID network of grant and contractual institutions and LDC governments. Research activities will be based on field-articulate concerns. A task force will be formed within the first year to determine research areas and priorities, beginning with a systematic survey and analysis of the state of the art. Problems to be addressed will include:

- a) creation and implementation of appropriate evaluation strategies and techniques for nonformal education;
- b) diagnosis of rural populations not in school and their educational needs;
- c) identification of major types of nonformal education programs and their components;
- d) investigation of existing inexpensive and practical nonformal educational techniques which would be effectively disseminated;
- e) analysis of the impact of nonformal education program on income distribution;
- f) indigenous non-Western learning programs in various cultures;
- g) educational approaches used successfully in rural development programs;
- h) comparative analysis of village simulation games;
- i) case studies of research and evaluation efforts, including obstacles imposed by

field conditions, successful quasi-experimental designs and innovative strategies.

Information Resources A resource center at the University of Massachusetts will be available to LDC and donor agencies. It will serve as a referral service to materials and human resources identified as useful to linkages established by the University, and a disseminator to interested clientele of technical notes, materials and training reports developed by the Center. An extensive nonformal education library will not be maintained; rather, efforts will be concentrated on making useful materials available to those that need them.

The University will participate in a worldwide network of institutional linkages involved in generating, perfecting, implementing and studying nonformal education activities. The network will provide for an information exchange with domestic and LDC institutions and agencies involved in nonformal education activities.

Consulting Services Faculty, graduate students, and associates of the University will be able to offer expertise in nonformal education theory and practice in the areas of training, research, materials development and delivery systems.

Science And Technology

The four programs described below are conceptualized on the premise that transfer of technology to non-technical societies has proved to be much more complex and difficult than originally envisioned. Each of the universities listed below is organizing its efforts so as to provide multi-disciplinary approaches to problem-solving and project development. Planning and implementation are conducted to allow for an interplay of social, economic and technical factors which emphasize the importance of institutional interrelationships in developing countries.

University	Field of Technical Concentration
Cornell University	Study and identification of alternate policies for the application of science and technology for national development.
Massachusetts Institute of Technology (MIT)	Technological requirements, components and adaptations required for industrial development.
Georgia Institute of Technology	Stimulation of small industry
University of Arizona	Management of arid and semi-arid lands

These programs are not integrated organizationally but they are complementary and mutually reinforcing. These grants are managed in AID/Washington by the Office of Science and Technology, Bureau of Technical Assistance.

POLICIES FOR SCIENCE AND TECHNOLOGY IN DEVELOPING NATIONS CORNELL UNIVERSITY

Grant Program Director: Dr. Edmund T. Cranch, Dean
College of Engineering
Cornell University
Ithaca, New York 14850

Departments Involved: Program on Science and Technology (STS), College of Engineering, Center for International Studies (CIS). A multidisciplinary faculty serves as the Executive Committee for the Program. Faculty members and students participate

in the courses, research and seminars sponsored by the Program.

The grant program at Cornell on "Policies for Science and Technology in Developing Nations." (PPSTDN), concentrates on the

analysis and study of policies concerning the application of science and technology to developmental problems in low income countries. It aims at building institutional capabilities at Cornell through faculty participation in a group of educational and research experiences that focus on the process of technology transfer to identify the vital steps that should go into the establishment of national policies in this area. It is hope that through joint research efforts linkages will be established with appropriate national agencies or institutions in each such major geographical areas as Africa, Latin America and Asia to jointly conduct research relevant to the Program and the participating country.

Cornell's Program on Science, Technology and Society, with a library on science and technology housed in STS, stimulates teaching and research on the interaction of science and technology with society. This program encourages the University's physical and biological scientists to study the role of scientific and technological factors, and their social-economic implications in public policy. The Center for International Studies, through the Southeast Asia Program, the Latin American Studies Program, the International Population Program, the International Agricultural Economics Program, the Tropical Soils Program, the International Legal Studies Program, etc., provide the mechanism for extending the program experience internationally. In the College of Engineering itself, approximately 40 percent of the faculty have had overseas experience, while in the College of Agriculture one-third of the faculty have had experience in less developed countries.

Of particular importance to the Program will be the development of an analytical base for establishing science program priorities, including the analysis of the interplay between overall strategies for technological development with sector and subsector strategies and with economic planning and total national investment decisions. Studies will also consider the derivation of such policies and strategies in the light of specific sets of

needs - e.g., industrialization, use of technical manpower, natural resource and land use, housing, water management, education of scientists and engineers, etc.

Instructional Resources: Many courses in the subject area were being taught at the University even before the inauguration of the grant program. However, since 1971, the Program has sponsored the following courses in cooperation with several departments at Cornell:

Science, Technology and development
The discussions relate to technical assistance, science policy and organization and technology transfer in the context of international development with particular reference to the processes involved in the adaptation and utilization of modern science and of physical and social technologies in developing countries.

Low-cost Housing Primarily for Developing Nations
The course focuses on housing policies for low-income families and explores the contribution that science and technology can make at the national and local levels to improve production of and access to housing for low-income families. A multidisciplinary team of five professors jointly planned and offered the course. A follow-on course focuses on the low-cost housing problems in specific developing countries.

Transportation Policies for Low-Volume Roads
A multidisciplinary study of the processes for the formulation of policy and planning of transportation facilities in developing nations. Areas of investigation include the policymaking process and strategy for policy implementation; economic policy and economic analysis methods for transportation; sociological considerations of transportation policy and technology for road building; a multidisciplinary team of three professors offers the course.

Other multidisciplinary groups of professors have met to discuss offering courses that have an LDC focus:

Land use and Natural Resources Planning
for Development
Management Needs and Training Strategies
for Developing Nations
Water Resource Planning and Management

The program has encouraged training of an applied nature as a key feature of its activities. Such training typically includes working with faculty and visiting professors on both research and teaching projects as well as opportunities for research overseas whenever feasible. Funding will be available to qualified students, and overseas research assignments can be arranged with counterpart institutions.

The program intends to foster interaction between Cornell and developing nations by inviting visiting scholars from such countries, exchanging graduate students and faculty members, and supporting projects of mutually useful research.

Research Resources The research component of the program emphasizes in-depth investigations and case studies involving the joint participation of personnel from both Cornell and institutions of developing nations. Initial analysis and research will identify areas where the lack of information or systematic analysis is a crucial limiting factor in the development of indigenous scientific and technological capability.

Research studies encouraged by the Program are in the areas of:

1. Criteria most useful in government resource allocation decisions regarding investment in science and technology infrastructure as against other national needs and goals.
2. Differential consequences of public investment in government-operated, university-based, or subsidized industrial research and development as they affect different fields of activity.
3. Alternative kinds of governmental structures for scientific and technological development, and authority and staffing requirements therefore.

4. Incentives, sanctions and rewards for inducing local scientists and technologists to concentrate their attention on major needs of their own societies and to reduce the incidence of talent migration.
5. Adjustments needed in public education to develop attitudes favorable to technological development.
6. Methods and criteria for on-going evaluation of national investment policies affecting science and technology and their social and political consequences.
7. Types of research and development best suited to a closer coupling with societal needs and for stimulating industrial development.
8. Interrelationships between research and development, industrialization, agricultural, modernization, and employment in developing countries.

The research activities supported by the grant will involve projects based on study within selected developing countries. This approach will enable Cornell to establish linkages between Cornell and specific academic or governmental institutions overseas. Some of the research will be designed so that graduate students can participate either on a project basis or for development of theses.

Informational Resources In combination with the large library system of the University, this resource is eventually to be developed so as to create a significantly useful data center in the subject area which may also be tapped by other institutions and scholars.

Inquiries about these resources, applicable research papers and professional publications and other data including the brochure on the "Program on Policies for Science and Technology in Developing Nations" should be addressed to Dr. Edmund T. Cranch, Director, Program on Policies for Science and Technology in Developing Nations (PPSTDN), 180 Uris Hall, Cornell University, Ithaca, New York, 14850.

Consulting Services Formulation of a general plan for making available consulting services in science and technology policy are currently evolving. Cornell's service abroad in such capacities has been widely known for many years. A variety of other special programs of the University have demonstrated international dimensions.

PPSTDN, under a separate contract, has been conducting a study on science and technology policies for a small developing country

(Costa Rica). The field work for the study has been completed and a final report will be published shortly.

The steady development of institutional capacity at Cornell to understand the role of science and technology and its contribution to the development process in LDCS, has enabled Cornell University to make available its consulting service capability to interested clients.

TECHNOLOGICAL REQUIREMENTS, COMPONENTS AND ADAPTATIONS FOR INDUSTRIAL DEVELOPMENT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Chairman of Institute Steering Committee for the Grant:

Dr. J. P. Ruina

Department of Electrical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts 02135

Departments Involved: Various departments and divisions of the School of Engineering; Sloan School of Management; Department of Economics and Political Science; Center for International Studies; Department of Urban Studies & Planning.

The long term aim of the M.I.T. program is to strengthen its capability to carry out research, analysis, education and training related to the adaptation and transfer of industrial and public works technology to the conditions of developing countries. The initial effort under this program is directed toward better understanding of the processes that enable technology to contribute to industrialization, with emphasis on the following:

1. Understanding the kinds and characteristics of technologies that are appropriate to countries in various early stages of industrial development.
2. Identifying the skills and criteria required to select and adapt technologies appropriate to developing countries. Examining the techniques for strengthening these skills, including technical

education and appropriate design of products, plants and processes suited to local conditions.

3. Understanding the processes by which technological and managerial knowledge and skills can be effectively introduced, disseminated, and used in developing countries, based on an understanding of local culture and traditions.
4. Examining long and short term economic and social advantages and disadvantages of importing rather than establishing indigenous manufacturing technology.
5. Finding effective technical solutions for developing countries including the adaptation of existing technology to local needs and conditions and devising appropriate new technology.

The engineering problems which are of broad interest to M.I.T. and in which the program may be expected to concentrate are chemical processing, materials and metallurgy, power generation and transmission, machine tools and materials processing, constructions, water resource development, communications

and data processing, and transportation. Other types of studies which may be pursued include the design of interacting systems of facilities (e.g. housing and transit in an urban area, management information, control systems, and procedures) and adaptation to the culture, labor availabilities, capital scarcities, etc., of developing countries. The economic-technical sequence of growth in an industrial complex may also be studied along with adaptations that must be made in specific cases for market and supply conditions, rudimentary infrastructure, etc.

In working towards an understanding of technology adaptation and transfer, M.I.T. builds upon its already substantial ties with developing countries in order to identify and attract the assistance of their best scholars, students and institutions, and to give M.I.T. faculty and advanced students experience in the countries being studied. Grant funds are

used to augment awards and fellowships of both foreign and American students working in this field. Multidisciplinary courses have been developed in the subject area, using both case studies and general analysis. Among M.I.T.'s resources for this is a substantial number of faculty and students from developing countries. Funds are also provided for strengthening library collections, which are, of course, open to those not at M.I.T. as well.

The Grant provides a locus at which the "development community" public and private, U.S., LDC and other international contributors can meet to exchange ideas and insights in the area of technology and economic development. A program of workshops and seminars on technical assistance problems have been developed in order to establish better communications between academic contributors and practitioners in the field. The fullest participation possible from people in developing countries is sought.

EMPLOYMENT GENERATION THROUGH STIMULATION OF SMALL INDUSTRY GEORGIA INSTITUTE OF TECHNOLOGY

Grant Program Director: Mr. Ross Hammond, Chief
Industrial Development Division
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

Departments Involved: The following is a sampling of the Organizational Units of Georgia Tech. which have potential involvements in the Employment Generation Program, and also have some experience in international activities: School of Architecture (City Planning); Department of Continuing Education; School of Chemical Engineering; School of Civil Engineering; Industrial Development Division; College of Industrial Management; School of Industrial and Systems Engineering; School of Mechanical Engineering; Southern Technical Institute; School of Information and Computer Sciences.

A massive problem faced by many developing countries is high unemployment and

underemployment, compounded by large numbers of young people who are now, or will shortly be joining the labor force thereby creating additional pressures for job generation. Associated with this problem is a continuing emigration from rural to urban areas, stimulated by the quest for employment opportunities and other real or imagined benefits. The creation of industrial activities in rural areas might produce an ameliorating effect, but there are certain typical problems clinging to small-scale industry development. These include the need for feasibility studies, the problems of siting, of diversification of products, of technological and production difficulties, of marginal profit-making. There are inhibiting factors such as a lack of specialists in management, manpower, training,

purchasing, production, market analysis and sales.

It is on these different areas that the 211(d) grant assigned to Georgia Institute of Technology focusses attention and encourages the study, extension and methodology of the mechanisms by which employment might be generated through expansion of existing industries and the creation of new ones. Georgia Tech. has had previous experience with countering such problems in the State of Georgia, and in Latin American countries.

Instructional Resources A major thrust at initial stages of this project was directed to designing, developing and getting approval for a new graduate curriculum in the School of Industrial and Systems Engineering. A Master of Science program ready for presentation in September 1974, is planned for both foreign and U.S. students who are interested in industrialization of developing regions and countries. The courses offered will fall into these general areas:

- Financial Resources
- Plant and Equipment Resources
- Human Resources
- Information and Control Systems
- Management of Improvement and Innovation

Electives are offered to provide additional depth and breadth to enable a student to achieve the objective of his specific program of study.

In addition to classroom courses, students are to complete a project which will provide a carefully guided practical experience related to industrialization.

The program is designed to be completed in not less than two academic years, actual length dependant upon the student's academic background experience and professional objectives.

Prerequisites define that entering students are required to hold a bachelor's degree from a recognized institution and that they have graduated in the upper half of their classes. A

background in engineering, sciences or management is preferred, and the program of study should have included:

- Probability and Statistics (6 qtr. hrs.)
- Introductory Operations Research (3 qtr. hrs.)
- Computer Programming (3 qtr. hrs.)
- Linear Algebra (3 qtr. hrs.)
- Engineering Economics (3 qtr. hrs.)

In the event these prerequisites were not a part of a Student's course, he may meet the requirements after admission by completing the appropriate courses at Georgia Tech.

A limited number of assistanceships are available to highly qualified students. For more information, write to the 211(d) grant officer, or communicate directly with:

Dr. R.N. Lehrer, Director
School of Industrial and Systems
Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332

Many seminars and workshops are constantly being held in which 211(d) program-associated staff actively participate. A few randomly selected topics include "Entrepreneurship", "Directions in Rural Development Planning", "The Role of Small Industries in Transfer of Technology", "The Micro Analysis of Technology choice and Employment", etc.

Research Resources A major objective of the total program is centered on the research inputs necessary for expanding the existing international development specialized data collection; a compilation and codification of case histories and initiation of new methodology and development; initiation of case history field research (by both staff and students); initiation of industry potential studies for counterpart institution countries; and economic analysis of counterpart institution countries utilizing on-hand and new data. To meet such objectives an International Data Center was

established and is carrying out the stated assignments.

The inter-disciplinary program at Georgia Tech. involves: The Industrial Development Division of the Engineering Experiment Station; the School of Industrial and Systems Engineering; the College of Industrial Management; and the Southern Technical Institute. Through coordinated work of these representatives, much information on small-scale industry initiated many research activities, sparking interactions with foreign universities and government organizations including:

Centro de Desarrollo Industrial del Ecuador, Ecuador
Fundacao Educacional do Sul de Santa Catarina, Brazil
University of Ife, Nigeria
Kenya Industrial Estates, Kenya
Soong Jun University, Korea
University of the Philippines/Institute for Small-Scale Industries, Philippines

The formalization and expansion of a library of reference materials and studies provides the basic information tools for such types of research as:

Preparation of case histories (from LDC experiences)
Applied research on employment generation approaches
Evaluation of alternative methodologies aimed at accelerating industrialization and employment
Relationship of infrastructure development to industrialization
Economic planning, strategies and alternatives
Analysis, evaluation and development of new industrialization techniques and principles, products and processes
Identification of appropriate manufacturing opportunities for LDCs
Engineering research related to specific appropriate industries
Analysis of manpower resource problems and opportunities

Import substitution analysis and procedures

Export development considerations and potentials

Investigations of natural resource potentials

Production of market analysis and feasibility studies

The end product of the research effort consists of reports, manuals, training packages, case histories and similar publications which can be utilized as support to the educational and training activities of the program, and as guidelines to expanding small industry complexes in the field.

Information Resources In organizing the international Development Data Center, an extensive bibliography of international development literature has been started with initial emphasis on bibliographies and sources of material resulting from communications with organizations active in the field. A subject heading file has been developed for quick reference to resource material.

Previously gathered Latin American material for the Data Center is being increased at the rate of 1,000 publications and 150 serials per year. The grant activity which deals with case studies (reported above under "Research Resources") involves identification, collection and analysis of studies drawn from existing literature. New studies are screened as they come in, reviewed and filed in the Data Center's stacks. At this time of reporting, some 50 published items in the general field of industrial stimulant and incentive programs have been filed.

As part of the well established information dissemination and exchange activities of the Industrial Development Division, many of its more than 600 published reports have been made available to the Georgia Tech. counterpart organizations during the first year of the grant. In addition to the overseas ties listed above, linkages with internationally oriented organizations contribute to exchanges of information, reports, seminar activities and so

on. They are both recipient and source for many pertinent materials on "Employment Generation via Small Industry Projects" These agencies include:

Agency for International Development
National Academy of Sciences/National Academy of Engineering
United Nations Industrial Development Organization
East-West Center, Hawaii
International Bank for Reconstruction and Development
Organization for Economic Cooperation and Development
Denver Research Institute
World Association of Industrial and Technological Research Organizations
Ford Foundation
Cornell and M.I.T. 211(d) Program
Industrial and Public Works Technology
Adaptation Programs on Science Policy

Consulting Services Administrative guidance and coordination

of the program has been received through meetings of an Internal Advisory Committee composed of senior individuals representing Academic Affairs; Southern Technical Institute, College of Industrial Management, Engineering Experiment Station, Research, General College, Graduate Program and the Industrial Development Division.

An External Advisory Committee, composed of individuals with distinguished records of international experience, holds annual meetings to advise and evaluate program activities. The membership represents such organizations as A.I.D., Cornell University, Soong Jun University of Korea, the World Bank, Ford Foundation, M.I.T., and representatives of the Georgia Institute of Technology.

As with all 211(d) grant programs, provision is included to offer the consultation services of qualified faculty members as requested, and when feasible.

All requests for such services should be directed to the 211(d) grant officer at the Georgia Technical Institute. He will provide the necessary information and guidance.

INTEGRATED NATURAL RESOURCES PLANNING AND MANAGEMENT OF ARID AND SEMI-ARID LANDS

UNIVERSITY OF ARIZONA

Grant Program Director: Dr. Jack D. Johnson,
Office of Arid Land Studies,
University of Arizona,
Tucson, Arizona 85721

Departments involved: Office of Arid Land Studies, with cooperation from Department of Watershed Management, Water Resources Center and other departments in the College of Agriculture.

The University of Arizona has, since the early 1900's, been recognized as a leading U.S. institution in arid and semi-arid lands research and management. By virtue of its

geographical location in the Southwest, this land-grant institution has been continually involved both academically and operationally with resource management problems and opportunities of arid and semi-arid ecosystems. The University's curriculum, research activities, involvement with other U.S. and international organizations, and overall approach to natural resources clearly reflect an interest in, and commitment to, an improved

understanding of principles and techniques for sound and land management.

An example of the University's perspective and interest is the establishment in 1958 of the Office of Arid Land Studies to provide for centralized, inter-department coordination of arid lands-oriented natural resource activities, with emphasis on interdisciplinary aspects. The OALS has evolved into a stable state-supported unit of international acclaim which has effectively mobilized scattered University resources to carry out arid land projects and studies.

The 211(d) grant will support a program to strengthen and expand the universities capabilities in multiple-use planning and management of natural resources in arid and semi-arid regions of developing countries. Natural resource management will include land, water, wildlife, forest, minerals and energy, assessment and mitigation of secondary environmental effects associated with natural resource development projects, and application of new technologies to problems of resource surveys, assessment and monitoring.

The University envisions the following products from the grant: (1) a centralized information system for natural resource management; (2) an improved education and training capacity; (3) increased knowledge of principles and techniques for assessing and addressing resource management problems and alternative remedial actions; (4) a competent and available advisory capacity; and (5) a network of worldwide institutional linkages.

Instructional Resources The University of Arizona has approximately 60 academic and non-academic departments actively involved in teaching or research related to some aspect of the planning and management of natural resources. A variety of interdisciplinary degree programs are offered such as those in Arid Lands Resource Sciences, Geosciences, Genetics, Latin American Studies, Linguistics, Oriental Studies, Urban Planning, Watershed Management, Wildlife and Recreation, and Water Resources. A new Dean of Natural Resources

has been hired by the University to expand the institution's international role and its multidisciplinary approach.

Also of significance are the resource management projects being carried out collectively by a number of University departments on several major southwestern Indian reservations. These reservations have many of the attributes of developing countries and the experience gained by University staff appears to be particularly relevant and transferrable to the developing country setting.

The Department of Watershed Management of the University is currently carrying out a program under another 211(d) grant to develop optimum utilization of water resources for agriculture, with special emphasis on systems analysis of watershed management under conditions characteristic of less developed countries. Institutional arrangements made at the University will assume coordination and mutual support between the two programs.

Research Resources As a result of research activities to be conducted under this grant, the University of Arizona will gain an increased understanding and capability to develop and/or adopt new resource management methodological and technological tools for application to the LDCs. Such research will be undertaken in the U.S. and also abroad in cooperation with LDC institutions, and will address topics which may include: concepts and techniques for resource inventory and assessment, physical and mathematical modelling of land use patterns and management alternatives, methodologies for predicting the ecological impact of specialized development projects; effectiveness of alternative governmental structures, public policies and regulations; constraints and opportunities with respect to interdisciplinary management techniques; and the inter-relationship among natural resource development, industrialization and urban and rural development. A minimum of two research projects per year will be conducted, at least one of which will be carried out cooperatively with an LDC institution.

Information Resources In addition to the University library of more than one million volumes, the Office of Arid Lands Studies has developed a computerized arid lands information system which is international in scope. As a focal point of arid lands scientific information, ALIS receives inquiries from throughout the world and is currently establishing institutional ties with Israel, Mexico, and Australia and establishing links through the United Nations. The ALIS has produced international scholarly publications including *Deserts of the World*, *Arid Lands in Perspective*, *Food, Fiber and the Arid Lands*, *Arid Lands Research Institutions: A World Directory*, *Arid Lands Abstracts*, and special resource papers on salinity, geothermal energy, groundwater law, and desertification.

Improved access to comprehensive and timely information and data in the area of natural resources management is needed concerning the nature of problems, the availability of new techniques and the location of expertise to apply to the problems. Under the grant, the University will establish a central information system which will inventory,

evaluate, and disseminate these types of information. Specific activities will include upgrading the bibliographic information service currently operated by the Office of Arid Land Studies to provide an increased international dimension and to expand its coverage of semi-arid land resource information; establishment and maintenance of a "talent bank" of U.S. and international capabilities, both of individuals and institutions; collection, synthesis, and appraisal of information on the technological state of the art; and distribution of a new international newsletter on natural resources management, research and related activities.

Consulting Services One of the major objectives of this program will be to produce faculty members and graduate students competent to provide consulting and advisory service to LDC institutions, AID, and other donors in support of resource management programs. The evolution of this capability will be gradual pending the emergence of a body of knowledge and a critical mass of staff members experienced and knowledgeable in this development area.

Appendix A

FUNDING OF THE INSTITUTIONAL GRANTS PROGRAM, 1967-1972

Contract Number	International Agricultural Economics	Date to Which Extended	5-Year Grant	Extension
CSD-2823	Cornell University (1970)		\$ 240,000	
CSD-2924	Iowa State University (1970)	Feb. 1976	375,000	400,000
CSD-2826	Michigan State University (1970)		625,000	
CSD-2815	University of Minnesota (1970)	Sept. 1975	800,000	no cost
CSD-3414	Southern University (1972)		500,000	
CSD-3415	Virginia State College (1972)		500,000	
			\$ 3,040,000	
	Agricultural Development in India			
CSD-1922	University of Illinois (1968)	Dec. 1973	\$ 200,000	no cost
CSD-1931	Kansas State University (1968)	Dec. 1973	200,000	no cost
CSD-1921	University of Missouri (1968)	June 1973	200,000	no cost
CSD-1928	Ohio State University (1968)	June 1975	200,000	no cost
CSD-1932	Pennsylvania State University (1968)	Dec. 1973	200,000	no cost
CSD-1927	University of Tennessee (1968)	Dec. 1973	200,000	no cost
			\$ 1,200,000	
	Soil and Water Development in Arid and Sub-Humid Areas			
CSD-2457	University of Arizona (1969)	May 1975	\$ 350,000	75,000
CSD-2460	Colorado State University (1969)	May 1975	750,000	100,000
CSD-2459	Utah State University (1969)	May 1976	750,000	no cost
G-1141	University of California Riverside (1974)		1,000,000	
			\$ 3,850,000	175,000
	Tropical Soils			
CSD-2834	Cornell University (1970)	Nov. 1975	\$ 500,000	no cost
CSD-2833	University of Hawaii (1970)		500,000	
CSD-2835	North Carolina State University (1970)		500,000	
CSD-2836	Prairie View A&M College (1970)	Nov. 1975	500,000	no cost
CSD-2857	University of Puerto Rico (1971)		500,000	
			\$ 2,500,000	
	Aquaculture and Marine Resources			
CSD-2780	Auburn University (1970)		\$ 800,000	
CSD-2455	University of Rhode Island (1969)	Aug. 1975	750,000	175,000
			\$ 1,550,000	175,000
	Ruminant Livestock Production			
CSD-3675	Texas A&M College (1972)		\$ 500,000	
CSD-3684	University of Florida (1972)		500,000	
CSD-3683	Purdue University (1972)		400,000	
CSD-3676	Tuskegee University (1972)		500,000	
			\$ 1,900,000	

Contract Number	Soybean Production	Date to Which Extended	5-Year Grant	Extension
G-73-49	University of Illinois (1973)		\$ 500,000	
G-73-50	University of Puerto Rico (1973)		500,000	
			\$ 1,000,000	
	Land Tenure			
CSD-2263	University of Wisconsin (1969)	June 1975	\$ 1,500,000	205,000
	Health and Population Planning			
CSD-1939	Johns Hopkins University (1968)	Feb. 1975	\$ 1,800,000	150,000
CSD-2171	University of Michigan (1968)	June 1974	1,250,000	no cost
CSD-1940	University of North Carolina (1967)	May 1974	2,400,000	no cost
			\$ 5,450,000	150,000
	Nutrition			
G-113	Massachusetts Institute of Technology (1974)		\$ 685,000	
	Law, Development and Modernization			
CSD-3151	Stanford University (1971)		\$ 700,000	
CSD-2485	Yale University (1969)		1,000,000	240,600
			\$ 1,700,000	240,600
	Comparative Legislative Studies			
CSD-3295	Duke University (1971)		\$ 500,000	
CSD-3293	University of Hawaii (1971)		235,000	
CSD-3294	University of Iowa (1971)		265,000	
			\$ 1,000,000	
	Economic, Social and Political Development and Modernization			
CSD-2958	Midwest Universities Consortium for International Activities, Inc. (1971)		\$ 1,000,000	
CSD-2547	University of Michigan (1969)	June 1977	675,000	942,535
CSD-2514	Southern Illinois University (1969)	June 1975	1,000,000	no cost
CSD-1929	Tufts University (1968, supplement 1970)		1,000,000	
6-73-251	Pace University (1973)		100,000	
			\$ 3,775,000	942,535
	Educational Development			
CSD-2825	University of California-Los Angeles (1970)		\$ 600,000	
CSD-2945	Florida State University (1971)		1,000,000	
G-1053	Stanford University (1973)		1,000,000	
G-73-17	University of California-Berkeley (1973)		998,354	
G-1112	University of Massachusetts (1974)		750,000	
			\$ 4,348,354	

Contract Number	Science and Technology	Date to Which Extended	5-Year Grant	Extension
CSD-3158	Cornell University (1971)		\$ 580,000	
CSD-3360	Massachusetts Institute of Technology (1971)		900,000	
G-73-18	Georgia Institute of Technology (1973)		800,000	
G-1111	University of Arizona (1974)		1,045,000	
			\$ 3,325,000	
	Total 211(d) Grants		\$35,823,354	
	Total extensions		2,288,135	
	Total 211(d) Grants and Extension to June 30, 1974		\$38,111,489	

Appendix B

AID POLICY DETERMINATION

The AID Policy Determination of October 30, 1974 in respect to the Institutional Grants Program includes sections on policy and objectives, project criteria, selection of grantee, and terms of grants.

POLICY AND OBJECTIVES

The Institutional Grants Program has for its purpose the creation, adaptation and strengthening of the competence and expertise of U.S. educational and university-affiliated research institutions to deal with the key problems impeding economic and social development in less developed countries. There are certain identifiable shortages of properly trained personnel and gaps in knowledge and skills that restrict the efforts of AID and other donors to carry out programs of assistance and collaborate in solving critical problems common to many countries. The Institutional Grants Program provides a mechanism to help overcome these deficiencies.

The grants are designed to yield outputs that serve the current and projected needs of the less developed countries. AID and other donors, at the same time, strengthening a new educational dimension and interdisciplinary approach at selected institutions. Institutional grants are to be used to develop response capabilities within educational and research institutions by building long-range resources in depth. There must be a presumption that without the grant such competence would not be developed soon enough or in sufficient depth to serve LDC, AID or other donor needs.

In addition, there must be clear evidence provided by the grantee that those aspects of the grant which are directly relevant to the grantee's primary educational and research role will become a permanent part of its

curriculum and/or research capability and financed in the future by the grantee institution, as well as evidence that capabilities developed under the grant will be utilized in joint problem-solving and knowledge transfers with LDCs.

SELECTION

A. *Project Criteria*

The following criteria will be applied by the Agency in identifying the need and selecting problem areas appropriate for institutional grant support.

1. An institutional grant project must be directed towards developing special competence in an area of skill or knowledge that is related to the actual or anticipated areas of Agency concentration and priorities, including the development of capabilities in techniques broadly required by AID such as sector analysis, project design and implementation, and evaluation. It is AID's responsibility to identify the priority problems and areas that meet this requirement, and to select the institutions which offer the most promise in developing additional capacities on the specified problems in which AID is interested. Therefore, institutions interested in participating in the program; should consult with AID to determine whether their proposal addresses a perceived need or interest of AID; preferably they should be responding to an AID initiative.

2. Ultimately, the solution of problems must be the job of the LDCs themselves; consequently, a key issue is the ability of the grantee to adapt and transfer knowledge to the cultures and milieu of the less developed countries. Hence, AID will limit grants as far as possible to those which involve a collaborative effort between the grantee institution and LDC institutions in the developing of competence.

3. Criteria to be applied to grant proposals include an assessment of:

- Current and projected demand from LDCs, from AID and other donor agencies and plans for utilization of capacity, as identified in USAID program submissions sector strategy statement and other AID documentation.

- The relevance of proposed activities to problems requiring joint problem-solving, applied research and training.

- The adequacy of grant design and concept.

- Proposed arrangements relating to participating in existing or potential systems or networks involving developed and developing countries and other U.S. institutions, and the likely effectiveness of mechanisms to achieve outreach in the proposed arrangements.

B. *Selection of Grantee*

1. AID will ascertain that a potential already exists in the institution to produce the work desired. Grant funds will not be used to germinate capacity where none presently exists, nor in areas which are not of priority concern to LDCs.

2. The recipient educational or university-affiliated research institution must furnish assurances that it is committed to the international development scene in general, and will commit itself to support the purpose and objectives of the proposed grant. Specifically, the recipient institution must be able and willing to prepare and develop special curricula, provide space and utilities, recruit and train personnel, engage in research as appropriate, and organize its program and

faculty so that the joint relationships with LDC institutions are established as an integral part of the grantee institution's academic and research life. The grantee must also commit some of its own funds during the life of the grant and provide assurances that it will continue to support the staff competence developed after the grant is terminated.

3. The recipient institution must be receptive, to long-term involvement in assisting and working with AID, LDCs and other interested institutions within the subject problem area, including collaboration with LDC institutions during and as a part of the grant. AID could then contract with the grantee to obtain training, research and consulting and related services once capacity has been sufficiently established according to appropriate AID selection procedures applicable to university contracts.

4. The object of 211(d) grants is to build upon, enlarge or make more specific the capabilities of the institutions to perform work on selected problems. AID is convinced that the solution to many problems in the LDCs can be solved only through a multi-disciplinary approach, and particularly through the application of non-economic social science perspectives, e.g., cultural anthropology. In determining grant recipients, AID will favor institutions which show the most promise of bringing a multi-disciplinary approach to the solution of development problems, where appropriate.

TERM OF GRANT

The development of institutional capacity requires continuity and assurance of funding beyond a single year. For this reason, a specific term for the grant will be determined and specified in the grant. Although five years has been the normal grant period in the past, the length of the term should not be arbitrarily established, but should be determined on the basis of a review of the proposed work plan and reasonable expectation about the time needed to develop the required capacity. At the end of this period, the grantee is expected to sustain a reasonable capacity through its

own funds alone, or in combination with funds from other sources, including AID contracts.

Although a grant will be approved for a specific term, the Agency will review the progress and monitor the effectiveness of the grantee on a continuing basis.

At the mid-period of the specific grant term, a special comprehensive review should be held to review progress, accomplishments and investigate ways to increase the effective utilization of grant-induced capacity. After grant termination, the usual and preferred method of utilizing institutional capacity created with grant assistance will be contracting with former grantee institutions for their services as dictated by the needs of the AID program, although contracts with former grantee institutions will be subject to normal Agency selection procedures.

It is recognized, however, that the Agency may choose to consider assisting some institutions after the completion of the specific term to achieve fuller and continuing utilization of their capacity, separate from specific contracts, because although these institutions are peculiarly relevant and have shown great interest and capacity to work with LDC institutions, they are not yet able to take on the full financial burden of sustained utilization of capacity. If these condition(s) prevail, the Agency may wish to finance a revised grant, limited to a one- to two-year funding increment to cover specific activities by the institutions involving continued utilization of capacities in the development process, e.g., training of LDC personnel, collaborative research, consultancy services, etc. A decision

to take such a step must be made one year prior to expiration of the grant and must consider the following factors:

- Need for the expertise.
- Relevance of problem area addressed by the grant to current areas of AID program concentration and priority.
- Performance to-date and results in achieving grant purpose.
- Development and application of new knowledge and innovative approaches, and participation in cooperative endeavors with LDC institutions, and other American universities.
- Commitment to long-term involvement in problem area.
- Clear need to receive continued grant support in order to maintain active utilization of the required capacity.

The review team will be chaired by a Mission Director, a high-level designee of the Director, or an AID/W Office Director designated by a Regional Assistant Administrator. Any revised or extended grant will be funded out of budgets for the affected Regions. Where the utilization of the capacity developed is worldwide, the Administrator may approve central funding, provided that at least one Mission Director or regional representative has served on the review team.

In some cases, it may be advisable to consider an additional utilization grant beyond the first increment. Such requests will be considered on their individual merits following a review at the mid-point of the first increment, using the above criteria.