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**A DIRECTORY OF
INSTITUTIONAL RESOURCES
supported by Section 211 d Grants**

**U.S. CENTERS OF COMPETENCE
FOR INTERNATIONAL DEVELOPMENT**

Prepared by
Office of Research and University Relations
Bureau for Technical Assistance

AGENCY FOR INTERNATIONAL DEVELOPMENT

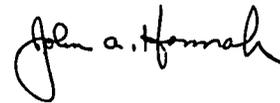
June 1972

FOREWORD

Many U. S. universities have long standing interests in the less developed countries. Since the beginning of the Point IV program, they have participated in the U. S. development assistance effort. They have supplied experts and advisors for overseas programs and trained thousands of students from the less developed countries. We believe universities will have an increasingly important role in U. S. Foreign Assistance in the future.

Section 211(d) of the Foreign Assistance Act authorizes funds for strengthening the capacity of U. S. universities which desire more involvement in international development. It is intended to support them in a more effective participation in their efforts to collaborate with developing countries seeking to achieve more meaningful lives for their people.

This directory lists the programs begun in the five years since the 211(d) program was initiated. We hope it will be a useful reference work for governments and institutions interested in knowing more about some of the specialized resources available in U.S. universities for assisting overseas development programs.



Dr. John A. Hannah
Administrator
Agency for International Development

PREFACE

American Universities have had a major role in the U. S. foreign assistance program almost from its inception. Some of them have had an institutional interest in other countries or other parts of the world, quite apart from their involvement with the Agency for International Development and its predecessors in technical assistance programs overseas. They now participate widely in providing training for nationals of other countries, in research dealing with development problems, in assisting with the development of counterpart institutions abroad, and in a multiplicity of technical assistance programs—all as a part of the U. S. foreign assistance program.

The over-all result of this wide-ranging involvement has been the development of an international dimension by these academic and service institutions. Larger numbers of their staff have acquired an understanding of development; of the social, economic and political aspects of other countries; of world geography, trade and resources; of the interdependence of nations and peoples. As a consequence a greater degree of competence for development work overseas has been created. A degree of specialization has occurred. Some universities have tended to become centers of competence in certain substantive areas of development work, and to establish contacts and communications with institutions in other countries having parallel interests. Yet it has been difficult for universities generally to maintain any large degree of active overseas involvement on a continuing basis. Contracts terminate. Overseas contract staff return home. Projects are completed. Funds for such work fluctuate. Staff attention necessarily turns from international concerns to domestic affairs.

To provide the larger dimension of specialized institutional competence needed in support of our foreign assistance program, Congress gave specific authority in section 211 (d), Title II of the Foreign Assistance Act of 1966 to use up to \$10 million each year to assist "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 authority was implemented through a series of five year grants to establish centers of competence in specific subject areas. The general concept was not to build a center from scratch but rather to take advantage of the

commitment of existing institutions and their permanent sources of funding in order to build into these U. S. centers a greater degree of permanence, and competence, on international development problems. The principal criterion for making such grants, in addition to AID's own need for a particular competence, is the degree of commitment the university itself is making or willing to make. In general, the university's commitment exceeds AID's. In each case, all overhead costs are contributed by the university.

The 211 (d) grant is made specifically for the purpose of developing the U. S. institutional competence that is relevant to significant problems in the developing nations. When grantees provide specific services to AID, such as technical assistance, consultation and participant training, these are usually handled under separate contracts.

This directory contains a complete list of institutions that have received 211(d) grants through May 31, 1972 (a total of 39 grants for a sum of \$26.5 million), along with a description of the resources and services that each can make available to USAID missions and others. These grantees have demonstrated a willingness and a capacity to work in a foreign environment in their fields of special competence. Because of their accumulated talent and knowledge resources, they are frequently able to provide substantial assistance rather quickly and well.

Institutions with 211(d) grants are, of course, not the only U. S. centers of competence in a particular field of specialization. However, the grants have generally been made to institutions that had already shown capability in a subject area and were committed to and investing their own resources in strengthening the international dimension of their work.

The directory should be of use to a broad spectrum of planners and practitioners in the developing countries, the AID Missions, development banks, foundations and other bilateral and multilateral technical assistance organizations that are concerned with where to obtain technical expertise or training in specific fields of development activity.

The grantees are grouped according to subject matter. However, some areas of competence cut across these lines, and the reader may need to look under several headings to locate all expertise in a specific field.

The directory includes the following kinds of information with reference to the grantees:

- Colleges and universities for consideration when placing graduate and undergraduate students for specific kinds of training, also for carrying out special workshops, etc.
- Where and how to obtain information on a specific subject.
- Research talents to fit specific local problems.
- Specific expertise for consultant service, either short term or long term.
- Availability for technical assistance projects.

To facilitate communication, the directory provides the name of the university 211(d) grant officer as a man totally knowledgeable about the

resources available and in some cases includes other university officials. Additional information on the grant program can be provided by the Agency for International Development, Washington.

The report was prepared in large part by Mr. E. G. Alderfer, a consultant to the Technical Assistance Bureau (TAB), under the supervision of Dr. Delbert T. Myren, Chief of the Planning, Analysis and Utilization Division of TAB's Office of Research and University Relations. University 211(d) grant officials cooperated by providing information in addition to regular annual reports and then carefully reviewed draft copy of their respective sections. AID/Washington staff assigned as Liaison officers for the various grants also made editorial suggestions.

This document is not intended as an evaluation or progress report on the 211(d) program, nor as an exposition of research findings or accomplishments by the grantees. Its purpose is to provide more complete information concerning educational resources and expertise available to those engaged in development assistance programs. We hope it will serve this purpose.

Dr. Erven J. Long
Associate Assistant Administrator
of the Technical Assistance Bureau
and
Director of the Office of Research and University Relations

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International Agricultural Economics

Four U. S. universities have formed an International Agricultural Economics Panel, with each of the four providing services and training in areas of somewhat differing but interrelated aspects of agricultural economic development. Two additional grants (to Southern University and Virginia State College), authorized in May, 1972, represent the related interests of two predominantly Black Institutions. 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 & underemployment 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 also agreed to make available up to a total of twenty-eight man-years of university talent to AID over the five-year period of the grants. At present four long-term assignments are being carried out in USAID missions in Panama, Colombia, and Korea, and three short-term assignments give support to activities of the agricultural economics division of AID's Office of Agriculture 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.

The six grants are monitored by the Office of Agriculture Technical Assistance Bureau, at the Agency's headquarters in Washington.

1. CORNELL UNIVERSITY
New York State College of Agriculture
Ithaca, New York 14850

Five-year grant \$240,000—csd-2823—authorized 24 June 1970

Departments involved: Department of Agricultural Economics and Office of International Agricultural Development

University 211(d) grant officer: Dr. B. F. Stanton, Department of Agricultural Economics

Introduction The advanced training and research capabilities of the New York State College of Agriculture are already well known to much of the developing world. The 211(d) grant is primarily directed to enlarging 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 for enabling graduate students to undertake field research in significant projects overseas.

The Cornell program in agricultural economics is problem-oriented. Study and research concentrate on sectoral 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 about forty members advising both undergraduates and approximately a hundred graduate students. About a third of the latter are working on degree programs concerned with 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 in international agriculture is broadly multinational. In a recent year it consisted of ten from the United States, seven from other English-speaking countries and Europe, and seven from Latin America, and five each from Asia and Africa. A number of students have collected thesis data by on-site research in a variety of developing countries.

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

- The Economics of Agricultural Development
- Advanced Economics of Agricultural Development
- World Food Economics
- Administration of Public Agricultural Programs
- Seminar on Agricultural Policy Agricultural Development in South Asia
- Seminar on Latin American Agricultural Policy
- Seminar on Agricultural and Economic Planning
- Models as Applied to Less Developed Economies

In addition, seminars on various phases of the subject area, including such subjects as agrarian reform in Latin America, are presented annually by visiting professors.

A variety of special workshops and lecture series, usually for one-week periods, are also presented. The June 1971 workshop was entitled, "Food, Agriculture, and Employment: The Social Impact of Modernizing Agriculture". The papers produced for the workshop will be published by Cornell University Press. Two special lecture programs may also be noted. Special lecture programs, each consisting of five lectures by noted persons, are presented each year. The 1971 lecturers included Dr. J. P. Bhattacharjee, Deputy Director of the FAO/IBRD Investment Center in Rome and Professor Benjamin I. Cohen of the Economic Growth Center at Yale.

The Department maintains active relationships with a number of scientists in developing countries. Within 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:

- Analysis of price-demand-supply structures for farm products
- *The role of agricultural trade in economic development
- Mexican agricultural policy
- Cost and economic effects of alternative policies designed to improve farm incomes
- Evaluation and improvement of tropical agricultural statistics
- Agricultural implications of rapid urbanization in the tropics
- *Economics of tropical agricultural commodities
- Economics of pioneer settlement in the tropics
- *Impact of new agricultural technology on rural employment and income

Resource productivity and output response in Latin American agriculture

The starred (*) items indicate the areas receiving major attention.

Graduate thesis research further extends the range of research interests, and this is particularly possible for students with financing from outside the University. In recent years graduate thesis research has included such topics as increasing productivity and employment in Jamaican peasant farming, the rate of adoption of new farm practices in Thailand's central plains, nutrition intervention in low-income countries and alternative strategies, sugar policies of developed countries and their implications for low-income countries, impact of a highway in Nepal on regional income and agricultural production, morphological characteristics and agricultural performance of major land types in Dominica, a full employment strategy for agriculture in Mauritius, benefits of broader markets due to feeder roads and market news in northeast Brazil, and economic evaluation of fattening beef cattle.

With support from the 211(d) grant, two graduate students are currently working on Ph.D. research topics in their home countries. An Iranian student is doing such research on marketing and trade, while another is studying a Nigerian mechanization project.

Much of the graduate research, including some post-doctoral work, is organized as sub-projects of long-term inquiries undertaken by senior staff, as listed above. A current example is a study of labor inputs and energy requirements for specific systems of rice production, undertaken in collaboration with the International Rice Research Institute (IRRI) in the Philippines, as a sub-project of the energy expenditures research program directed by a senior staff member of the Department at Cornell.

A closely related research area is labor productivity and employment opportunities within and outside of the agricultural sector, some of which is supported by an AID research contract. This entails the study of

work requirements for different technologies and related nutritional needs. In addition to the IRRI project, labor productivity and employment studies are now in progress in Uganda and western Nigeria.

A research focus on international trade and commodity markets currently involves nine graduate students under the direction of a senior staff member. Four of these assignments have specific relation to a set of projects related to development in Nepal where good working arrangements have been established with the USAID mission.

Cooperative research efforts are also undertaken with the Economic Growth Center at Yale University, with special attention to import substitution in agriculture, and why and with what effects export surpluses arise in specific areas. International nutritional needs and commodity programs constitute yet another set of research interests, which are reflected in interaction with AID/Washington.

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.

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. In 1972 Cornell will have 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 America 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, off-prints 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

2. IOWA STATE UNIVERSITY Ames, Iowa 50010

Five-year grant \$375,000—csd 2824—authorized 24 June 1970.

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

University 211(d) grant officer: Dr. Erik Thorbecke, Department of Economics.

Introduction 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 consolidated nature of the Department gives it a strong comparative advantage in the study of the relationship between agriculture and the rest of the economy throughout the process of development.

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 prob-

lems. 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.

In 1971 a Major conference on Agricultural Sector Analysis and Planning was organized at the University. Both practitioners and users of sector analysis were represented. Among the sector studies presented were (a) a simulation model of Nigerian agriculture; (b) a programming model of Mexican agriculture; (c) a micro-dynamic model of Punjab agriculture, and (d) a general equilibrium sector analysis of Guatemala. Representatives from AID and from international agencies participated.

Instructional Resources In the last year, two graduate courses in development have been added to the curriculum—one on the economics of agricultural development and another on economic development and growth processes. Titles of graduate-level courses on economic and agricultural development of an international character are currently 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 and lawyers 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 Guatemala'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 (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 intrasectoral 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 two dozen such titles were produced in 1970-71, 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 recom-

mendations 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 have 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.

3. MICHIGAN STATE UNIVERSITY East Lansing, Michigan 48823

Five-year grant \$625,000—csd 282^b—authorized 29 June 1970.

Departments involved: Department of Agricultural Economics, College of Agriculture and Natural Resources, and Institute of International Agriculture; Curriculum in Public Affairs Management.

University 211(d) grant officer: Dr. Dale E. Hathaway, Department of Agricultural Economics.

Introduction Michigan State University is heavily committed to graduate training in international economics 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. In this way international activities in agriculture are interlinked with the University's area centers for Latin America, Africa, and Asia, as well as with institution-building contracts overseas. An extra instructional dimension to the program has been added through the development of a new undergraduate curriculum in public affairs management, emphasizing the managerial skills required in the public sector for rural development programs.

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 Masters'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 provide additional instructional re-

sources. For example, in the summer term of 1971, a research workshop on Rural Development in Pakistan was organized by the university's Asian Study Center and included faculty and discussants from universities here and abroad as well as government and agency officials and graduate students. In March 1971, Dr. Hans Singer of the Institute of Development Studies at the University of Sussex, England, presented five two-hour seminars on international development and foreign aid and met with faculty and students in informal sessions during the Spring term. A research seminar on Employment and Income Distribution Problems in Developing Countries, held in December 1970, was worked out between MSU staff and the Agricultural Development Council, New York, and involved the participation of specialists from a wide variety of agencies and universities.

A year-round schedule of single departmental seminars is annually developed, and in 1970-71 the topics included:

The Middle Eastern Crisis
Reflections on Soviet Agriculture
The Poverty Issue in Planning
Regional Models of Economic Activity
involving Natural Resources
Administrative Problems for Agricultural
Development
The Role of International Development
Agencies in Solving Problems of Unemployment, Land Reform and Income
Distribution
Agricultural Diversification: Concept, Purposes and Research Challenges
Needed Redirections in Economic Policy
for Agriculture
Investment and Disinvestment
Designing Agricultural Investment Projects
under Humid Area Rainfall Patterns.

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. Such arrangements are underway in Colombia and several African countries. Currently seven graduate students receive full support from the grant for their research programs, and three receive partial support. The Department also encourages student research support from other sources.

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 and Korea).

One senior staff member has been engaged for more than eight years in research on the agricultural development process in Tropical Africa with emphasis on planning and policy analysis. During the past two years his research has 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 is now being 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 and an extensive study on the subject published in Tokyo in 1971.

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 and distributes them throughout the world. 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. Advisory services undertaken during the 1970-71 academic year include:

Colombia: helping develop a statement of national policy for food marketing
 Colombia: AID consultation on agricultural marketing problems
 Peru: AID consultation on agricultural marketing problems
 Nigeria: consultation with GON to assist Director of Federal Livestock Department
 Tanzania: AID consultation on agricultural research priorities
 Ghana: AID consultation on agricultural policy

Congo: U.S. National Academy of Science Mission

Korea: agricultural sector analysis planning
Korea: establishing an agricultural policy sector study

FAO, Rome: presentation of a seminar on agricultural sector simulation models.

During the same year, one senior economist was on full-time loan to the Technical Assistance Bureau of AID/Washington and another was on full-time loan to the USAID Mission in

Colombia. An agricultural mechanization adviser was also occupied in Southeast Asia.

The faculty of the Department has focused 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.

4. UNIVERSITY OF MINNESOTA St. Paul, Minnesota 55101

Five-year grant \$800,000-csd 2815—authorized 24 June 1970.

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 the two departments); Center for Comparative Studies in Technological Development and Social Change; Office of International Programs.

University 211(d) grant officer: Dr. Vernon W. Ruttan, Department of Economics, Department of Agricultural and Applied Economics, and Economic Development Center.

Introduction 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 seminars 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 seminar sessions (21 were held in fiscal year 1970-71) 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. In the last couple of years these special non-degree programs have included two persons from India, and one each from 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.S. students at the thesis level, using AID, SEADAG, and Ford and Rockefeller Foundation grants. These assistantships have supported approximately twenty students during the past five 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. During the 1970-71 academic year they included professors from Germany, India, Turkey, Israel, and Japan, as well as from Harvard and the Agricultural Development Council.

Research Resources: Major research effort at the Economic Development Center and its two inter-linked Departments has been concentrated in three areas of significance to the developing economies: (1) labor markets, (2) commodity markets and trade policy, and (3) technical change in relation to agricultural development. However, the program of the Center is not limited to these three areas. For example, during the coming year Center work will be initiated in the areas of sector analysis and planning in population economics and policy.

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 Development (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.

In addition to research spin-off from the University's inter-institutional programs in Tunisia and Argentina (see "Consulting Services"), 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 member is engaged in a major research project on "Exchange Control, Liberalization, and Economic Development" at the National Bureau of Economic Research. Another is involved in an extensive analysis of "Foreign Investment 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 Department 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 *Soybeans and Their Products: Markets, Models and Policy* (University of Minnesota Press, 1971).

In India two members of the Department

have been working with the Ford Foundation, one having just completed a two-year assignment as program advisor in economics for the Foundation, the other as a researcher on the economics of improving village irrigation systems and as a teacher in resource economics at the Indian Agricultural Research Institute. Major objectives of the program are threefold: (a) to develop a program of training and research for state and central government personnel in investment planning, (b) to strengthen economic research in the Ministries of Agriculture and of Foreign Trade, and (c) to develop a research program in regional agricultural 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 a UM graduate student each year conducts his thesis research.

Information Resources With a collection of nearly three million volumes, the University of Minnesota Library now ranks as one of the larger 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 begun a Reprint Series of significant articles written by staff and published by professional jour-

nals of economics. Four such reprints have thus far been issued:

The 1967 Peruvian Exchange Crisis: A Note
Factor Prices and Technical Change in Agricultural Development: The United States and Japan, 1880-1960
Korean Rice, Taiwan Rice, and Japanese Agricultural Stagnation: An Economic Consequence of Colonialism
Agricultural Productivity Differences Among Countries.

Single copies of these may be obtained from the Economic Development Center at the University.

It should be added that a recent major work by two staff members, Yujiro Hayami and Vernon W. Ruttan, has just been published by The Johns Hopkins University Press, Baltimore and London, under the title *Agricultural Development: An International Perspective* and is available through the publisher.

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:

Technology Transfer and Agricultural Development (1971)
An International Comparison of Agricultural Production and Productivities (1971)
Johnson and Johnson on Sugar Policy (1971)
Wage Structure in Latin America (1970)
Induced Innovation and Agricultural Development (1970)
Growth with Unemployment in Latin America: Some Implications for Asia (1970)
Development Strategy for a Medium-Sized Economy (1969)
Optimum Patterns of Agricultural and In-

dustrial Development for a Small Economy (1968)

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 obtained from University Microfilms, Ann Arbor, Michigan. They include:

Sung Hwan Ban, *Long-Run Productivity Growth in Korean Agricultural Development, 1910-1968* (1971)
Eduardo Sarmiento, *Efficient Allocation of Resources in the Supply of Water for Domestic Consumption, Colombia* (1971)
V. S. Rao, *Disaggregated Demand and Some Aspects of the Pure Theory of International Trade* (1970)
Lawrence B. Morse, *The Peruvian Experience with Fixed and Flexible Exchange Rates: An Empirical Examination* (1968).

The Economic Development Center also issued, 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 Departments, seven staff have recently consulted in Argentina, Tunisia, Morocco, Nigeria, India, the Philippines, Indonesia and Korea, and one member of the staff is carrying 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. Six 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, is supported by the Ford Foundation. The main objective of the Argentine Agricultural Economics Project is 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 is sponsored by an Argentine institution (university, research center, or government agency) and is committed to work for his sponsoring institution upon completing the Ph.D. degree. His doctoral thesis research must deal with problems of Argentine agriculture. Five Fellows have since completed the degree work, twenty are presently preparing theses in Argentina, and nine are completing course work in the United States. One staff member serves as coordinator of the Project at the University of Minnesota, and another directs 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.

5. SOUTHERN UNIVERSITY Baton Rouge, Louisiana 70813

Five-year grant \$500,000—authorized May 1972.

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

University 211(d) grant officer: Dr. T. T. Williams, Office of the President.

This grant program, which has just been authorized at this writing, cannot be detailed at this juncture since its implementation and detailed characteristics are now being evolved. The 211(d) grant, however, is in-

tended to strengthen the two Departments through adding staff, providing student fellowships, developing seminar programs, and supporting research activities. The grant program will also relate with 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 com-

ponent 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 non-farm employment. The total effort in this important area will involve state funds, federal funds specially directed at applied research 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.

6. VIRGINIA STATE COLLEGE Petersburg, Virginia 23803

Five-year grant \$500,000—authorized May 1972.

Department involved: Bureau of Economic Research and Development, and the Departments of Economics and of Agricultural Economics.

University 211(d) grant officer: Dr. Huey Battle, Bureau of Economic Research and Development.

As with the preceding institutional grant program, that of Virginia State College, which has just been authorized at this writing will be developed in detail when funded. 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 two departments. The valuable 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 uni-

versity wide developmental program will be one component involving instructional and applied research with an emphasis on actual experimentation with 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.

Over the initial years of the grant, Virginia State will collaborate 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 will develop with other U.S. universities involved in rural development programs. This relationship will involve an exchange of professors and students, jointly designed and implemented research with LDC colleagues, participation in development workshops and seminars as well as participation in talent sharing arrangements with AID/W and AID/field missions.

Agricultural Development in India

II

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

India's long struggle to match food production to the needs of its rapidly multiplying population constitutes one of the massive efforts of modern times. To contribute usefully to the task, six American land-grant universities created an informal association (CUSURDI) to collaborate more effectively in supporting their respective institution-building programs with Indian agricultural universities and institutes. Simultaneously they have 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 maintain a direct relationship to Agricultural Production Projects with Indian agencies at state levels.

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

Within the overall CUSURDI framework, however, each member institution is 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 agromonic crops	Orissa, Bihar
Ohio State	Soil-plant-water relationships	Punjab, Rajasthan
Penn State	Crop production and management	Maharastra
Tennessee	Agricultural economics	Mysore, Madras

The general objectives of this collaborative interinstitutional effort are 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 with 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 are, of course, generalized concerns. Although the focus of the Council is specifically on Indian agricultural development, the land-grant methodology and approach is believed to have broad applicability to international development generally.

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

7. UNIVERSITY OF ILLINOIS Urbana, Illinois 61801

Five-year grant \$200,000—csd 1922—authorized 19 June 1968.

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.

University 211(d) Grant Officer: Dr. James Sinclair, Department of Plant Pathology.

Introduction 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, and several are usually resident 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 Sierre Leone, Thailand, Indonesia, and Colombia as well.

The professor of international plant pathology, whose activities are partially supported by the 211(d) grant, serves 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 multi-

disciplinary in character and have a close relationship to the India program in plant pathology. A Program for International Research, Improvement and Development of Soybeans (PIRIDS) was recently inaugurated by the university, with a grant from the Rockefeller Foundation. "Strategies for Agricultural Development" is another recently activated multi-disciplinary project with several important sub-projects in India. A "Tropical Root Program" is another similar enterprise of the university, as is a program of the Department of Agricultural Economics, supported by a Ford Foundation grant, for helping to develop that discipline at the Uttar Pradesh Agricultural University where the plant pathology program is also active. In short, the purposes of the 211(d) grant have been 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. These include courses in agronomy, rural sociology, agricultural economics, home economics, animal science and horticulture as well as plant pathology. The Department of Plant Pathology consists of twenty-three faculty members and currently has thirty-three graduate students enrolled. 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 Economics 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
- Economics 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. Some of the assistantships, which are available to both U. S. and foreign students, are supported by the 211(d) grant. The University maintains a Foreign Students Office to help with both university and government formalities, registration, housing, financial aid, and counseling.

Original plans called for complete support for graduate students while gaining their overseas experience in India with 211(d) funds, but when this source proved insufficient arrangements were completed for additional support from USAID/India Local Currency Contracts. Currently there are five students in this program, all from the United States. A number of Indian students, however, are involved in the graduate program at Urbana, with various sources of support including 211(d) funds.

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. The success of the interlinked graduate and faculty research is demonstrated by the fact that 16 research papers, published in various professional journals and publications, have resulted since the 211(d) program was inaugurated. 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 are being 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.

Graduate students in the department generally select problems related to this subject, thereby coordinating not only with the aforementioned PIRIDS (soybean) project of the University but also with the interests and focus of the Indian institutions. Their study and research in India takes place at one of the two Indian institutions. Eventually the PIRIDS project will operate in twelve countries. The Soybean Coordinated Research Project in India, funded under two AID contracts, is an integral part of this effort. So is the Regional Soybean Research Laboratory of the U. S. Department of Agriculture on the Illinois campus.

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 interuniversity 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.

USAID contracts facilitate the work of the Department both at the Uttar Pradesh Agricultural University in India and the Njala University College in Sierra Leone. Two short-term consultants have also served in Indonesia under the AID contract with the Midwest Universities Consortium for International Activities (MUCIA).

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

8. KANSAS STATE UNIVERSITY Manhattan, Kansas 66502

Five-year grant \$200,000—csd 1931—authorized 31 May 1968.

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.

University 211(d) Grant Officer: Dr. David R. Lineback, Department of Grain Science and Industry.

Introduction 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 information 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 Indian 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. Currently KSU is engaged in an institution-building contract with AID to assist Andhra Pradesh Agricultural University. An important component of the India program at the University, since 1966, is 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 involves 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)
- Tropical Agronomy (Agronomy)
- 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. The Senator Frank Carlson Forum on World Food Problems was held at Kansas State in 1969 and 1971. In the latter year the Seventh National Conference on Wheat Utilization was held here. Various other seminars and con-

ferences in this general area of specialization involve participation of foreign students, scholars and government officials. In recent summers a short course in Grain Storage and Marketing was conducted under the provisions of an AID contract and enrolled participants from various foreign countries. Faculty members also presented a short course on Grain Milling at the Central Food Technological Research Institute in Mysore, India.

Some fellowships and assistantships are available to foreign students. Those who are awarded assistantships have the non-resident fees waived and pay \$12 per semester hour when enrolled in seven or more semester hours of work, plus campus privilege fees. Orientation, guidance and academic counseling, 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 has 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. Current graduate research in India involves investigations of the baking quality of numerous varieties of Indian wheats for white bread, and of the application of insecticides (fumigants) commonly used for grain storage in India 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. A case in point is an informal arrangement with the Central Food Technological Research Institute at Mysore through which certain research assignments are undertaken and published jointly.

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 of 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 the past three 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 of West Africa under the provisions of an AID contract to assist with problems of grain storage and marketing. 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 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.

9. UNIVERSITY OF MISSOURI Columbia, Missouri 65201

Five-year grant \$200,000—csd 1921—authorized 31 May 1968.

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.

University 211(d) Grant Officer: Dr. J. M. Poehlman, Department of Agronomy

Introduction 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 carries 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 new courses have recently been developed:

- (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 nationals. In the most recently completed academic year sixty-two graduate students were registered in the Department of Agronomy, of whom twenty-six were foreign nationals—some supported by departmental funds and other fellowships, and some by AID. A few graduate assistantships are also available to U. S. nationals to provide them with opportunity to conduct thesis research in India.

Occasional professional seminars are 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 The linkage with Indian institutions has enhanced the two-way flow of research data pertaining to the plant breeding program, particularly in regard to evaluating wheat breeding genetic materials and other cooperative research. Some of this interchange resulted in the preparation of a textbook on *Breeding Asian Field Crops*, published in Calcutta and jointly authored by the University's 211(d) grant officer and the chairman of the Agricultural Botany Department at Orissa University.

A wheat breeding research program was cooperatively initiated at the Orissa institution, which experiments with crosses between adapted Indian and Mexican dwarf varieties. A major objective of this work is to develop varieties resistant to blight and rust. The research is calculated to be of benefit to both Indian and United States production.

Indian-related research is also directed to the production of pulse crops, particularly mungbeans, the principal pulse grown in Orissa State. Research in this program is carried forward both in India and Missouri and involves yield studies of many strains and the identification of plant materials for improved yields, early maturity, and disease resistance.

The mungbean research project, which can have considerable economic and dietary consequence for both Indian and other developing countries, is also being used as the vehicle for international graduate student thesis research. Graduate students supported by the 211(d) grant are provided an opportunity to conduct part of their thesis research in India, providing the student receives admittance to a cooperating Indian university.

Laboratory facilities at Missouri for plant breeding research have already been mentioned, and the Agricultural Experiment Station also has extensive greenhouse and field plot facilities.

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.

The joint task forces of the College of Agriculture with the University of Orissa have participated not only in mutually useful research but also assisted the Indian institutions to develop long-range agricultural planning programs and instructional plans.

10. OHIO STATE UNIVERSITY Columbus, Ohio 43210

Five-year grant \$200,000—csd 1928—authorized 31 May 1968.

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

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

University 211(d) grant officer: Dr. George S. Taylor, Agronomy Department

Introduction 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 the 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 have been 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, as in the case of the University's centennial year (1970) seminar on the utilization of soil-water-plant resources in world food production.

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 contract programs with India and Brazil.

Research Resources Grant funds permit several U. S. graduate students concentrating in soil-water-plant studies to undertake graduate research in India. For that purpose arrangements have been made with the Punjab Agricultural University and the University of Agricultural Sciences at Bangalore. Recent graduate research subjects include such topics as zinc characterization and availability in Indian soils, potassium

release and fixation, phosphorus extraction from soils of southern India and resulting yield responses, and other soil mineralogical investigations.

Faculty research in India and Brazil usually involves two or three faculty members per year, and several have undertaken research-consultation assignments in Africa and Central America. In general, Department research centers on production problems of tropical soils, and on water management, soil fertility evaluation, and the interrelationships between 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.

Each American graduate student doing research in India has joint advisors—the regular faculty advisor at Ohio State and a professor in his discipline at an Indian institution. Research problems are selected jointly by the two advisors with the student.

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 outlined 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.

11. PENNSYLVANIA STATE UNIVERSITY
University Park, Pennsylvania 16802

Five-year grant \$200,000—csd 1932—authorized 31 May 1968.

Departments involved: Department of Agronomy.

Indian counterparts: Mahatma Phule Agricultural University at Poona; APP program in the State of Maharashtra.

University 211(d) grant officer: Dr. Richard H. Cole, Department of Agronomy

Introduction 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, are 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 is primarily implemented through a Professor of International Crop and Seed Production who serves as the grant officer.

Principal attention has been given to the area of forage crop improvement and production, and soil characterization in less developed countries. Other areas of interest include 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 has been 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, is held monthly to orient all concerned with family life abroad, with international travel, and with program

commitment. Special efforts are 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 request.

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 are developed, encourage mutual exchanges of thesis problems and research topics. Cooperative research interests center principally on grain and forage crop production. Special attention is given to production and crop management of sorghum and soybeans, crops of important potential value to India.

Within this framework, the major factors being studied are 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 includes 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.

Somewhat similar research arrangements are being developed with the Graduate School (INTA), Castelar, Argentina.

The Department of Agronomy welcomes additional collaborative arrangements with other LDC institutions in temperate areas where cool season 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-supported 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. Recently, a thesis involving the use of phosphorus on Indian soils was published, and similar studies may appear in the future.

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. 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.

12. UNIVERSITY OF TENNESSEE Knoxville, Tennessee 37901

Five-year grant \$200,000—csd 1927—authorized 31 May 1968.

Departments involved: Department of 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.

University 211(d) grant officer: Dr. David W. Brown, Department of Agricultural Economics and Rural Sociology.

Introduction The 211(d) grant at the University of Tennessee supports the agricultural economics component of the overall CUSURDI program. It focuses on developing capabilities for tackling the economic and social problems of disadvantaged farmers.

Particular attention to date has been given to needs of South India where the University has 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 has been more on programs at local and regional levels than on broad policy issues.

Recent and current research related to South India bears 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 has been 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 by 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 is currently being 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 recent 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 and 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.

Recent agricultural economics studies that relate to South India include:

Modernizing the market structure for food grains in Tamil Nadu State

Strategies for improving the market structure for food grains in Mysore State
Design of Agricultural credit programs in Mysore State
Economic analysis of crops and land use localization in the Tungakhadra irrigation project of Mysore State
Developing and restructuring regulated markets (food grains) in Mysore State
Agricultural program planning to reflect potentials of small farms, with applications to Mysore State.

Other recent 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.

Informational 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.

There are not as yet any special publication series stemming from the 211(d) work. Output so far has been in the form of theses and dissertations, conference presentations, and mimeographed materials. Inquiries about obtaining or borrowing copies of these can be made to the 211(d) grant officer.

Team progress reports and technical consultant reports related to the Tennessee/AID contract work in Mysore and Tamil Nadu States of India are reproduced in limited numbers, and can be obtained or borrowed 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.

Overseas activities have not been as extensive as at some major land-grant universities, but there is a strong interest in encouraging such arrangements for faculty and graduate students on at least a modest scale. Of particular interest are educational, research, and advisory activities that link to problems being dealt with in Tennessee and that integrate well with improvement of campus teaching capacities. The Institute of Agriculture has thus far concentrated especially on India, but the longer run desire is to implement relationships in other parts of the world as well.

Water Resources for Agricultural Production

Council of U.S. Universities for Soil and Water
Development in Arid and Sub-Humid Areas
(CUSUSWASH)

III

Four universities—Arizona, Colorado State, Utah State, and California at Davis—have formed 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 first three of these institutions received 211(d) grants in 1969, and they issue joint annual technical reports relating to their grant-supported activities. The grants have had a multiplier effect (a) in stimulating the commitment of other resources to the program, (b) in increased 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 have a rich history of studying such problems as they relate to our own arid West. In extending these capabilities to selected areas overseas, each of the three grant-aided institutions emphasizes its own special area of competency in coordination with the others.

University	Field of Technical Concentration	Geographic Application
Arizona	Watershed management with emphasis on systems analysis of water-related problems	Latin America; also Asia
Colorado State	Water delivery and removal systems and related institutional development	Worldwide, but especially Pakistan and Thailand
Utah State	On-farm water management for increasing food production	Latin America; also Africa

Inter-university collaboration in this field of endeavor has had and continues to have direct results. 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, all four of the 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 CUSUSWASH enterprise gives long-overdue recognition to the critical importance of water resource management for agriculture 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 in food production. The CUSUSWASH program takes into account the complex chain of factors affecting water resources and their use.

The CUSUSWASH projects are monitored at AID/Washington by the Office of Agriculture in the Technical Assistance Bureau.

13. UNIVERSITY OF ARIZONA Tucson, Arizona 85721

Five-year grant \$350,000—csd 2457—authorized 23 May 1969

Departments involved: Department of Watershed Management with cooperation from other departments in the College of Agriculture; Water Resources Research Center; Office of Arid Land Studies

University 211(d) Grant Officer: Dr. Malcolm J. Zwolinski, Department of Watershed Management, College of Agriculture

Introduction The University of Arizona's role in the CUSUSWASH program gives special emphasis to the science and methodology of applying systems analysis techniques to the water and related food production problems of less developed countries. This involves economic evaluation for optimal use of water and land, analysis and characterization of hydrologic systems, and the use of simulation techniques for predicting the production of water and sediment.

The Arizona grant-supported program has two basic goals. One pertains to the expansion of full-time professional personnel and of the graduate research-teaching program in order to help develop a core of watershed manage-

ment consultants available for service to developing countries. A second goal is to develop a storehouse of information which can be shared with less developed countries. The latter involves the collection, evaluation and modification of mathematical models and computer simulation programs of both the physical and economic aspects of hydrologic systems. It also includes the collection of data relative to the world-wide location of problem areas, the types of watershed problems occurring, and the overseas individuals and institutions engaged in confronting them.

Interdepartmental as well as inter-institutional collaboration provide cross disciplinary linkages for the Arizona program. Stochastic analysis of precipitation and streamflow, decision analysis of resource management, and watershed modeling projects are joint ventures of the departments of Watershed Management, Hydrology and Water Resources, and Systems and Industrial Engineering. The recently established Office of Arid Land Studies serves as a coordinating agency in such activities, and acts as a clearinghouse for the exchange of world arid lands information and as a liaison with international bodies and

foreign institutions concerned with arid zone problems.

Instructional Resources The University of Arizona is one of only a very few universities with a full range of degree programs in watershed 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 Watershed Management Department conducts an annual two-week short course for Bureau of Land Management personnel on basic factors affecting water movement, storage, distribution, and losses, as well as on data collection and analysis, and on water management in arid environments. A hydrology short-course is also conducted annually for the U. S. Geological Survey. Plans for a major seminar on systems analysis in resource management, involving leading scientists from various universities, are proceeding.

Several half-time graduate research assistantships are available to students in the subject area of systems analysis in watershed 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, and 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 Watershed Management Department are particularly concerned with the objectives of

the 211(d) grant program. Their specialized interests include systems analysis, forest 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 through (a) individual faculty relationships with the National Institute of Mexico and several universities in that country, and through (b) an AID mission-sponsored program in Northeast Brazil. 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 management, and climate patterns for agriculture and forestry.

The Watershed Management Department 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:

- 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 systems 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
 Point rainfall frequencies in convective storms
 Prediction of convective storm run-off in semi-arid regions
 Evaluation of the effects of water yield management
 Systems analysis: a decision-making tool for arid land development
 Mathematical methodology in hydrology
 Operations research study of water resources: methodology and problems in an urbanized environment
 Operations research study of water resources: case study of Tucson Basin
 Analysis of ephemeral flow in aridlands
 Experimental program for analysis and validation of watershed models
 Systems theory: a new approach for modeling watersheds realistically
 A computer automated hydrologic data acquisition system
 A direct passive electrical analog model of a watershed

All of the above have appeared in professional journals, and copies may be obtained from the Department of Watershed Management.

Information Resources Information on specialized library resources may be obtained from the University Librarian, and several specialized abstracts and bibliographies have been prepared. The latter 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)

These, along with an on-site study of "Major Watershed Installations the Southeastern United States", are available to qualified field practitioners on special request to the Department.

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, and water quality management and control. Other areas of specialized interest and capability have been noted above. Contractual consultation arrangements may be made with individual staff, by special arrangement with the University, but, because of the complexity of water management problems, team consultation is considered the most desirable.

Staff consulting assignments in the subject area have involved work in Mexico, Venezuela, Northeast Brazil (in cooperation with the University of Caera), and Pakistan. In general, geographic areas of interest to the staff are the Near East, Far East, East Africa, and South America.

14. COLORADO STATE UNIVERSITY Fort Collins, Colorado 80521

Five-year grant \$750,000-csd 2460—authorized 23 May 1969

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

University 211(d) Grant Officer: Dr. Maurice L. Albertson, Department of Civil Engineering

Introduction 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 salin-

ity. 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 develop-

ment. 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 Project, 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 subject 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.

During the last two years approximately 480 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 Bibliography (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 Constrictions 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

15. UTAH STATE UNIVERSITY
 Logan, Utah 84321

Five-year grant \$750,000—csd 2359—authorized 13 May 1969

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

University 211(d) Grant Officer: Dr. H. B. Peterson, Department of Agricultural and Irrigation Engineering

Introduction 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 Portuguese 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 Portugesc. Beginning in 1972, such courses will be offered on the campus for the benefit of the many Latin American students and for U. S. 211(d) students as well.

The University manages 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 is 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. This will be offered in Spanish in 1972. 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 tutored 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 (those indicated by asterisks in the list below) 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.

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
Cornell University	Cultural systems for soils of the tropics
University of Hawaii	Biology and mineralogy of soils of the tropics
North Carolina State University	Soil fertility relating plant nutrition to the physical and chemical properties of tropical soils.
Prairie View A&M College	Soil fertility problems under savanna-prairie ecology.
University of Puerto Rico	Conservation and protection of soils of the tropics



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 development 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.

Thus far, for the Consortium as a whole, the grant-supported effort has resulted in the development of 15 new courses and 12 revised courses, and the hiring of the equivalent of eight new full-time professional staff, two post-doctoral fellows, 20 graduate assistants, three long-term and 25 short-term visiting professors and scientists and one exchange professor. To strengthen further the teaching component of the Consortium program, a "Workshop on Teaching Basic Soils" with particular reference to the tropics was held for teachers of the Consortium institutions. Three of the universities (Hawaii, Puerto Rico and Prairie View) have begun to develop audio-visual teaching techniques for soils courses, and one (Prairie View) is developing an autotutorial system for a "Tropical Soils Resource and Enrichment Center" that will serve both undergraduate and graduate students.

The Consortium also represents a many-faceted network of research projects. The research programs of Cornell and North Carolina State, for example, are closely interrelated and coordinated. Cornell also subcontracts with the University of Puerto Rico, and thus the three institutions are in fact an informally associated research group. Grant support has also enabled the Prairie View College to involve graduate assistants in research work, and four new research projects are financed mainly from other sources. The research program at Hawaii is at the point of major expansion. Inter-institutional collaboration has also expanded service and consultation programs of the institutions.

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

16. CORNELL UNIVERSITY New York State College of Agriculture Ithaca, New York 14850

Five-year grant \$500,000—csd 2834—authorized 30 June 1970.

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

University 211(d) Grant Officer: Dr. Matthew Drosdoff, Department of Agronomy.

Introduction 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 person-

nel 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 a dozen members of the faculty in Soil Science have had direct work experience in tropical countries, and the service capabili-

ties 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 in Tropical Agriculture
- 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 other week during the academic year. Visiting scientists are brought to the campus for periods of a week to a month 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 soil 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. Graduate assistants are all provided the opportunity to undertake 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 is also participating in the development of an intensive Tropical Soils Institute to be held in Puerto Rico in July-August 1972. Areas included in the study program include soil classification and geomorphology, soil physics and climatology, soil chemistry and mineralogy, and soil-plant-water relationships. The Institute will combine lectures, 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 and the University of Puerto Rico, are studying soil fertility problems of the humid tropics. Cornell is also engaged in a major technical assistance program at the College of Agriculture of the University of the Philippines in which emphasis is directed to graduate research and training.

The Agronomy Department staff maintains research contacts with scientists and institutions in Colombia, Brazil, Venezuela, and Nigeria, 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.

Requests for information about consulting services and personnel available may be addressed to the head of the Department of Agronomy, Emerson Hall, Cornell University.

17. UNIVERSITY OF HAWAII Honolulu, Hawaii 96822

Five-year grant \$500,000—csd 2833—authorized 2 November 1970.

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

University 211(d) Grant Officer: Dr. W. G. Sanford, Department of Agronomy and Soil Science.

Introduction The University of Hawaii is one of 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. A Workshop held July 10-24, 1971, for example, brought together staff from the cooperating institutions who are involved in 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. Recently, consideration has been given to possible USAID research contracts on silting and soil-water-plant research in the Mekong Delta.

With the purchase of an x-ray fluorescence spectrometer, a Soil, Tissue, and Forage Analysis Laboratory is being developed at the University. Samples from the Pacific Basin, East Asia, and from other members of the Consortium will be analyzed here, and local research capabilities will be 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 Hamil-

ton 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 overseas. 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.

18. NORTH CAROLINA STATE UNIVERSITY
Raleigh, North Carolina 27607

Five-year grant \$500,000—csd 2835—authorized 2 November 1970.

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

University 211(d) Grant Officer: Dr. Pedro A. Sanchez, Department of Soil Science.

Introduction 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.

A syllabus for a new graduate course on "Properties and Management of Tropical Soils" has also been recently completed; the course will be 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 participa-

tion 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 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 crop fertilization.

Long-term faculty research in tropical soils has been conducted for more than a decade in Peru, and in Brazil, Colombia, 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 are being developed to initiate research on soils-related problems in the following countries:

Guatemala (nitrogen and micronutrient fertilization in Pacific coast lowlands and volcanic ash highlands)

Colombia (composition and classification of selected soil profiles from rain forest area in the southeast)

Panama and Bolivia (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).

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 Colombia 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.

19. PRAIRIE VIEW AGRICULTURAL & MECHANICAL COLLEGE Prairie View, Texas 77445

Five-year grant \$500,000—csd 2836—authorized 30 June 1970.

Department involved: Department of Plant and Soil Sciences

University 211(d) Grant Officer: Dr. J. I. Kirkwood, Department of Plant and Soil Sciences.

Introduction Since its inception, Prairie View A&M College 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 College is developed in coordination with and supported by Texas A&M University.

The College's work in tropical soils emphasizes soil fertility problems of the subhumid 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 college'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, and Agricultural Engineering, and has recently completed planning for a Master of Science degree program in Tropical Soils to match its M.S. programs in Agricultural Education and Agricultural Economics.

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

Soil Microbiology
Plant Nutrition and Soil Fertility

Soil Mineralogy in Relation to Soil Formation
 Soil Physics
 Tropical Soils
 Soil Fertility Problems on Savanna-Prairie Ecology
 The Physical Chemistry of Soils
 Fertilizer Technology and Usage
 Special Problems (soil-plant relations, clay mineralogy, micro pedology, chemistry of soil organic matter, thesis, environmental quality, soil survey and photographic interpretation).

Courses in related areas include:

Advanced Pasture and Range Management
 Grain and Fiber Crop Production
 Disease of Field Crops
 Advanced Plant Physiology.

In cooperation with the Peace Corps training program at Prairie View, a soils staff member and another from education, who are acquainted with cultural practices in Niger and Upper Volta in Africa, present seminars related to the interests of the tropical soils program. Occasional non-degree short courses are also presented for foreign nationals.

Periodically planned 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, and Uganda. 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. Seven scholarships are available for candidates for the M. S. degree in Tropical Soils or Agricultural Education. Four of these are allocated to students from foreign tropical countries. In this regard the College has

established a link with Njala University College in Sierra Leone, West Africa. Foreign graduate students with fellowships pay the same tuition as non-foreign students. Overseas research opportunities for graduate students are also available.

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 science, animal science, and rural economics and problems of rural poverty in South Texas.

Plant and Soil Science research includes soil chemistry and fertility, soil microbiology and biochemistry, and consumer use and marketing of vegetables and fruits. Animal science research includes swine growth and nutrition, beef and dairy cattle management systems, poultry marketing 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 and the Mother and Teacher University of the Dominican Republic, and explorations with other institutions in the Caribbean and Africa, provide resources for expanding the research program overseas.

Publication of research studies by staff in professional journals is increasing. Several bulletins have been issued and distributed to the Tropical Soils Group. They include

“Maize, a Second Crop in West Africa” and “Lime Requirements of a Plenthis Soil.”

Informational Resources At the Prairie View Resources 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 College also makes arrangements with Texas A & M University for preparation of slides and prints and for publication needs, as well as for duplicating services.

A bulletin series as mentioned above is being developed and expanded.

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

Tropical soil fertility
Soil survey 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 the Dominican Republic. Other members are experienced in the soils of the West Indies.

20. UNIVERSITY OF PUERTO RICO

Mayaguez, Rio Piedras
Puerto Rico 00928

Five-year grant \$500,000—csd 2857—authorized 4 March 1971.

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

University 211(d) Grant Officer: Dr. R. Pietri, Agriculture Agent, College of Agricultural Science.

Introduction 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-supported 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 will, of course, 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 addressed to 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.

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 monitored at AID/Washington by the Office of Agriculture, Bureau of Technical Assistance.

21. AUBURN UNIVERSITY Auburn, Alabama 36830

Five-year grant \$800,000—csd 2780—authorized 24 June 1970.

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

University 211(d) Grant Officer: Dr. H. S. Swingle, Department of Fisheries and Allied Aquacultures.

Introduction The term aquaculture refers to the farming of water for har-

vesting 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 eighteen 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.

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 28 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, in the process of completion, will greatly increase laboratory as well as classroom and office space. 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 con-

structed 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, Ecuador, Panama, El Salvador, the Philippines, Thailand, India—and the development of a handbook on fish culture research methods in cooperation with FAO. Studies in Brazil, Panama, El Salvador, Thailand, and the Philippines are under USAID contract auspices, while the work in India was under a USAID contract with the University of Tennessee. 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. A computerized program for information retrieval is under consideration. 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 since 1969.

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.

22. UNIVERSITY OF RHODE ISLAND Kingston, Rhode Island 02881

Five-year grant \$750,000-csd 2455—authorized 7 May 1969.

Departments involved: International Center for Marine Resources and Development; Graduate School of Oceanography; Departments of Marine Technology and Fisheries and Food and Resource Economics, College of Agriculture; Departments of Geography and of Ocean Engineering; and The Law of the Sea Institute.

University 211(d) Grant Officer: Dr. John A. Knauss, Provost for Marine Affairs; address inquiries to Director, International Center for Marine Resources and Development.

Introduction As is evident from the list of departments involved, the grant-supported program at the University of Rhode Island is a multi-disciplinary enterprise. The program deals with the complex areas of marine resource economics, marine biology, oceanography, ocean engineering, fishermen training, fishing gear research, 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 Resources and 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 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 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 Economics, Geography, Political Science, and Resource Economics, with support from the International Center for Marine Resource Development.

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 University's multi-disciplinary Policy Committee on Marine Affairs encourages departmental use of distinguished visiting professors expert in marine resource development and cooperation with other universities engaged in related studies. Relations with foreign universities in this context are primarily with institutions in Southeast Asia and Latin America.

The following sampling of courses illustrates the strong relationship between international economic development and the marine resources program at the graduate level:

Living Marine Resources and Their Legal and Political Implications (Oceanography—course built around a classroom simulation of two fishery organizations, one domestic and one international)
Problems of Modernization in Developing

Nations (Economics—interdisciplinary seminar)
Economic Growth and Development (Economics)
Resource Economics: International Resource Development (Resource Economics—coastal zone and marine resources)
Economic Planning and Public Policy in Developing Nations.

A Graduate Certificate Program in International Development Studies is offered each Spring semester and consists of a five course program leading to a graduate certificate. The departments of Economics, Geography, Political Science, Resource Economics, Sociology and Anthropology, as well as the Center, contribute to the interdisciplinary character of the program.

Seminars and special lecture series are important parts of the instructional scene. The subjects of these change from year to year, but they have included such topics as Issues in International Development, Modernization and Environment—the Impact of Western Ideas on Traditional Societies, and The Necessary Revolutions for Human and Resource Development.

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 of 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.

Specific faculty research activities include background studies on fishery development potentials in the South China Sea, Latin American fisheries resource economics, a cooperative program for assisting developing countries with food technology problems in concert with a U. S. universities Consortium for the Development of Technology (CODOT), increasing the use of resources through the opening of new fishing areas, developing a systems structure for the Latin

American fishing industry, developing a bibliography and index of maritime social studies, relationships of the seaweed-microbial food base, a socio-economic and resource assessment of the fisheries consequences of a major engineering project in East Pakistan, and socio-economic studies of Tanzanian coastal communities.

Graduate research studies include those on fish protein concentrates, carotenoids, and the economics of aquaculture.

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.

The Center has worked with the University of Florida in developing the fishery portion of their program of assistance to the National Agricultural Center in Saigon. The project is carried out under AID/Education and includes advice on curriculum planning, cooperative graduate programs, and research activities. The two universities have also collaborated on extension work in tropical agriculture and socio-economic problems of the coastal settings in Latin America.

With the University of Tennessee the Center is participating in working out a joint study, involving coastal fisheries among other elements, in India under the provisions of an AID contract.

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 contacts are primarily with Brazil, Argentina and Chile. The International Center for Marine Resource Development acts as the contracting and business agent for the Consortium.

Land Tenure

23. UNIVERSITY OF WISCONSIN Land Tenure Center Madison, Wisconsin 53706

Five-year grant \$1,500,000—csd 2263—authorized 28 April 1969.

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.

University 211(d) Grant Officer: William C. Thiesenhusen, Director Land Tenure Center, 310 King Hall.

Introduction 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.

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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 Change 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 Special research capabilities and interests of the Land Tenure Center follow a series of specific guidelines and thus form an integrated multidisciplinary approach. The guidelines are as follows:

1. Study of the effects of present land tenure systems on agricultural development, which includes building a comprehensive body of knowledge dealing with land ownership, land and water tenure, and agrarian institutional structures.
2. Study of new tenure arrangements in areas of major agrarian reform, and of tenure conditions in areas of colonization and new land settlement, including case studies and comparisons of costs and impact.
3. Study of means of providing equitable and effective distribution systems of inputs to small farmers—including extension, land registry and titling, technical information, market and credit services, all at the lowest possible cost.
4. Study of changes in social, economic, and political relations required for achieving agrarian reform, including changes in local government organization and development of voluntary associations.
5. Study of the legal framework which regulates economic and social activities in the rural sector, and of the legal and administrative machinery for carrying through agrarian reform programs.
6. Study of the impact of changing technology and related measures of rural modernization on employment creation and income distribution in rural areas both before and after land tenure reform.
7. Study of the economic, social and political consequences of rapid rural-to-urban migration, including study of tenure conditions in communities or origin.
8. Study of the diversity and functioning of indigenous tenure types and the various means by which they are affected by new technology and development programs.

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 20,000 titles. Although the majority of materials are from Latin America, many recent acquisitions relate to African and Asian land tenure and development. The Library is particularly rich in government documents, reports, research papers and reprints which are not otherwise readily available. It 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. The Library can furnish copies of materials 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 trade include those of Cornell, Indiana, Michigan, Michigan State, Purdue, Southern Illinois, Tulane and Stanford. Bibli-

ographies and accession 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 in Latin America on Land Tenure and Agrarian Reform in Mexico, Chile's Agricultural Economy, and on Colombia and Venezuela.

In one recent year alone the Center produced 41 new publications in its different series, including a series of "Latin American Research Briefs," which are five- to ten-page summaries of Center research findings.

The several series of publications are labeled (a) LTC Reprints (over 70 titles), (b) Training and Methods (a dozen titles), (c) Research Papers (about 30 titles), (d) LTC Papers (about 30 titles), and (e) Discussion Papers. A number of publications have also been produced jointly with the Instituto Interamericano de Ciencias Agrícolas in Bogotá, 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.

Twelve 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. 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 institutions
- Land ownership distribution and government assistance
- Land reform program analysis
- Agricultural tax programs

Current assignments of staff include those to AID missions, host country governments, and a variety of regional and international development agencies.

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.

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 monitors 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.

24. THE JOHNS HOPKINS UNIVERSITY
School of Hygiene and Public Health
Baltimore, Maryland 21205

Five-year grant \$1,800,000—csd 1939—authorized 31 May 1968.

Departments involved: Population Center; Department of International Health, Department of Population Dynamics, with collaboration of Departments of Behavioral Sciences, Biostatistics, Public Health Administration, Epidemiology, Pathobiology, and Medical Care and Hospitals.

University 211(d) Grant Officer: Dr. Carl E. Taylor, Department of International Health.

Introduction 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 is helping to organize the 16th Triennial Congress of the International Confederation of Midwives and 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 general 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. Staff are 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, six students were enrolled in the Department of International Health's Residency Program, nine in the Doctoral Program, twenty in the MPH program, and nineteen were awarded Senior Health Planner Certificates. Eleven students were undertaking Special Studies in International Health.

Courses given by the Department of Population Dynamics are as follows:

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 last 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 211(d) grant funds and from the Ford Foundation. U.S. scholars may receive support from HEW 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 LDC 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.

25. UNIVERSITY OF MICHIGAN
School of Public Health
Ann Arbor, Michigan 48104

Five-year grant \$1,250,000—csd 2171—authorized 28 June 1968.

Departments involved: Department and Center of Population Planning, School of Public Health; Populations Studies Center; Center for Research on Reproductive Biology. University 211(d) Grant Officer: Dr. Snehendu B. Kar (acting), Department of Population Planning

Introduction 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, a number of research and administrative staff, and librarians and planning were working in related job assignments in less developed countries as of 1971.

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 stu-

dents 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 interests 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 area considerations. Recent graduate 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). The second, with the Government of Malaysia's National Family Planning Board and with initial Ford Foundation support, was inaugurated in 1966. In 1968, with AID support, the Center began assistance to the Government of Nepal's family planning program, and in 1970-71 cooperative research activities were developed with the Indian Institute of Technology, Kanpur, India.

Other research projects in India include studies of attitudes toward induced abortion

in New Delhi, fertility and family planning in an Indian village, effects of population education in an Indian village school (the findings were used for planning a long-range population education program with the University of Baroda), demographic and economic relationships in Baroda, and the economic impact of India's family planning program (with partial support from the Population Council). Motivational determinants of family planning are being studied comparatively in India and Chile.

A number of research projects are being carried forward under the auspices of the National Family Planning Board of Malaysia, including an extensive family planning acceptor survey, an evaluation of the national program for administrative use and for training personnel, and an action study of the utilization of village midwives in the family planning program.

In addition to Malaysia and India, studies have been made in Taiwan on medical correlates of intrauterine device use, and in Togo to assess the knowledge and practices of auxiliary midwives.

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 are appearing 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 Infor-

mation 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 newsletter. 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 AFD 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

26. UNIVERSITY OF NORTH CAROLINA
Carolina Population Center
Chapel Hill, North Carolina 27514

Five-year grant \$2,000,000—csd 1940—authorized 31 May 1968.

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.

University 211(d) Grant Officer: Dr. Moye W. Freyman, Carolina Population Center.

Introduction 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 U.S. Programs Office coordinates field work in the United States. The Center's Academic Programs Office helps to build basic teaching and research programs on campus.

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 ad-

ministration—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 interests 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 comparable 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; and 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. An international conference on abortion research is sponsored jointly with the International Union for the Scientific Study of Population.

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 frequently 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 postgraduate 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 goal, 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 a recent year graduates from North Carolina were placed as interns in Iran, the Philippines, and Thailand. For additional information on internship opportunities, inquiries should be addressed to the Center's International Programs Office.

Altogether the Center's involvement in international collaborative research programs has involved arrangements with institutions and agencies in some twenty countries, and other institutional exchange relationships exist in Thailand, India, Iran, Egypt, Ghana, and Brazil.

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 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 South-eastern 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 Center's International Programs Office.

Law, Development and Modernization

Law and legal systems play a significant role in development and change. In some circumstances, they may obstruct progress; in others, they might be used to encourage constructive 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 principal but not exclusive attention on Spanish-speaking Latin America. 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 Yale Law School grant was authorized in June 1969, while that at Stanford was not authorized until nearly two years later.

The Stanford grant program is monitored 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.

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27. STANFORD LAW SCHOOL Stanford, California 94305

Five-year grant \$700,000—csd 3151—authorized 28 May 1971.

University Program Director: Professor John Henry Merryman, Stanford Law School.

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.

Introduction 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 program 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 In addition to the standard law school curriculum, various courses, both within the Law School and in other departments of the University, provide the advanced student with orientation to the interrelationships between legal institutions and economic and social development. For example, a Law School seminar in Law and Development is open, through cross-registration, to graduate students in other faculties; it focuses on concrete examples drawn from contemporary experience in Latin America, Africa, Mediterranean Europe, and Asia.

Five other courses in the Law School curriculum touch upon problems of development from the perspectives of international or comparative law. A series of more specialized course offerings, dealing with legal systems of particular countries or with the legal effects of particular mechanisms of development activity, is being developed by Law School faculty and cooperating scholars from other disciplines. Related offerings of other university departments include:

Developing Economies (Econ.)

Economic Development in Latin America (Econ.)

Economic Development I and II (Econ.)

The Politics of Economic Change (Pol. Sci.)

Legislatures and Development (Pol. Sci.)

International Trade and Development (Business).

Law School faculty participants in the grant program meet regularly with scholars from other departments to develop a conceptual overview of the subject area as a framework for specific interdisciplinary research undertakings. A series of interdisciplinary workshops is being planned to bring together Stanford participants, government officials, and scholars from other institutions in the United States and abroad. Some workshops will be problem-oriented, others country-oriented, and a few will concentrate on methodological problems. Papers and proceedings of the workshops will be published.

Fellowships are available to selected graduate students and more senior scholars identified by two groupings: (a) Scholars in Residence from Latin American countries, and (b) Work-study Fellows, recent U.S. law school graduates. Scholars in Residence are chosen from Latin American personnel who have worked directly in government or legal education. Their Stanford program provides for an average stay of six months when they will have opportunity to conduct program-related research, to work on new teaching materials, and to participate in teaching and gain familiarity with U.S. methods. Work-study Fellows are placed in work-study situations in cooperating law schools or other legal institutions in Latin America, normally for a calendar year. They undertake specific research projects on critical legal problems of development in their host countries.

Academic counseling of foreign students is carried out by faculty members on an individual basis. The University maintains a variety of facilities, including the Bechtel International Center, for their non-academic support.

Research Resources The special research competencies and interests of the Stanford Law School faculty in the subject area include the comparative study of law and legal systems, international law and institutions, international trade and finance, natural resources, the intersection of economics and law, and the application of social science methods to the study of legal systems and 'legal culture'. The overseas focus of research in Law and Development is concentrated principally in Spanish-speaking Latin America.

The Stanford Law School maintains informal arrangements with law faculties or legal research institutions in the following countries:

Chile: University of Chile at Santiago, the Catholic University at Valparaiso, the Catholic University of Chile at Santiago, and the University of Concepcion.

Costa Rica: the University of Costa Rica.

Mexico: the Institute of Legal Research of the National Autonomous University of Mexico.

Italy: the Institute of Comparative Law of the University of Florence and the University of Rome.

These arrangements provide opportunities for overseas graduate and faculty research studies in the subject area. Similar arrangements are currently being developed in Peru.

Since 1966 ten North American graduates of the Law School have spent one year or more in the AID-supported Law Project of the Law Faculty of the University of Costa Rica or in the Chile Law Reform Program sponsored by the International Legal Center of New York City. In these assignments they are able to study legal aspects of the development process at first hand and to conduct empirical research on specific development-related problems.

Although as of this writing no formal arrangements have been concluded for cooperative research with other institutions, Stanford program activities are informally coordinated with the Yale Law School's "Law and

Modernization Program." Eventually, plans call for cooperative arrangements with Yale and other institutions for exchange of faculty members and research personnel, and joint workshops and seminars.

In its 'theory-building' aspects, Stanford research will include some use of computers as an aid to studying the dynamics of legal systems and institutions. Facilities for computerized research are available in the University's Computer Science Department and its Computation Center.

Information Resources 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. An experimental program is underway to establish a central, fully computerized information retrieval system. 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 the appropriate departmental library or to the Reference Department of Stanford's Main Library.

A comprehensive survey of the literature in the field of Law and Development is well under way; an extensive bibliography is to be anticipated from this activity. Preliminary working papers in the subject area have been disseminated to other institutions on a selective and informal basis, and additional research papers and monographs will be disseminated as completed, either through publication in scholarly journals or in multilith. Recent research publications have included a study of "Legal Culture and Social Development" issued in the *Law and Society Review*, a work on *International Law, Development and the Transit Trade of Landlocked States: the Case of Bolivia* (published in Germany 1969); and a number of major articles on problems of development in Volume VI (Spring 1971) of the *Stanford Journal of International Studies*. The latter includes articles on "Technology Transfer and LDC's:

A Proposal for a Preferential Patent System," "Trade Preferences and the Export of Manufactures from Developing Countries," "Multinational Portfolio Diversification in Developing Countries," "Commodity Regulation in a Developing Country: the Sugar and Alcohol Institute of Brazil," and "Organizing for Industrial Development: the Experience of Costa Rica." Requests for copies of these publications should be addressed to the Librarian, Stanford Law School.

Although no single research collection in the subject area as a whole yet exists at Stanford, a comprehensive collection at the Law School is in the planning state, with particular reference to Latin American law and legal institutions. The Law School has already developed a basic collection in Chilean law, to which the bulk of its 5,000 volumes in Latin American law is devoted. Plans call for doubling the size of the collection by adding volumes on the laws of other Latin American countries.

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. Specific competencies for consultation are generally those indicated above under "Research Resources".

In recent years three principal faculty participants in the Law and Development Program conducted a special project under the auspices of the International Legal Center of New York City by which groups of young Chilean law teachers were brought to the U.S. for a special instructional program at Stanford followed by periods of residence at other U.S. law schools. The emphasis of the program was on legal education in development. The volume cited above on "International Law, Development and the Transit Trade" was undertaken in cooperation with the IBRD, the UN Development Program/Special Fund, and the Government of Bolivia.

28. YALE UNIVERSITY LAW SCHOOL. New Haven, Connecticut 06250

Five-year grant \$1,000,000- csd 2485-authorized 27 June 1969.

University 211(d) Grant Officer: Dr. William L. F. Felstiner, Program in Law and Modernization, Yale University Law School

Departments involved: The Yale University Law School, Departments of Political Science and Economics, and the Consilium on International and Foreign Studies.

Introduction 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 the last two 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 conference 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 discussed 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-Bandial," "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.

Shortly before the preparation of this directory, three 211(d) university grants were authorized to help correct this imbalance. The first such grant was awarded to Duke University in June 1971, and early development of the Duke program permits a fuller report of the special capabilities it has in this field than with the other two programs which are at this point just getting organized. The programs at the State University of Iowa and at the University of Hawaii were inaugurated in the Fall term of 1971, and because detailed planning is still in process, they can be reviewed here only in summary and future-looking terms.

Duke University: the legislative influence on specific developmental problems, with reference to legislative institutions in South Asia, Latin America, Africa and British Commonwealth countries.

University of Iowa: inter-country comparative studies of legislatures and their performance, with geographic focus on Africa and Asia.

University of Hawaii: institutionalization and functions of legislative bodies in selected areas of Asia and the Pacific, with linkage to national development.

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 monitored by the Civic Participation Division, Office of Policy Development and Analysis, Bureau for Program and Policy Coordination.

29. DUKE UNIVERSITY Durham, North Carolina 27706

Five-year grant \$500,000—csd 3295—authorized 30 June 1971.

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.

University 211(d) Grant Officer: Dr. Joel Smith, Department of Sociology and Anthropology.

Introduction 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, the 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 Ex-
periments (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:

Joina Kenyatta's Concept of Parliament:
Nation-Building and Representative In-
stitutions in Kenya
The Legislative Council in Northern Rho-
desia, 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
Sokota (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 Associa-
tions and Social Networks.

Although formal research arrangements with overseas institutions have not yet been established, negotiations have been initiated with the Catholic University of Chile, the Institute of Commonwealth Studies in London, the National Center for Scientific Research in Paris, and the Institute for Advanced Studies in Vienna. 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.

30. UNIVERSITY OF HAWAII Honolulu, Hawaii 96822

Five-year grant \$235,000--csd 3293--authorized 11 August 1971.

Departments involved: Departments of Political Science and History; Social Science Research Institute.

University 211(d) Grant Officer: Dr. Norman Mellor, Department of Political Science.

Introduction As noted above, the University of Hawaii's grant program on comparative legislative studies was just inaugurated in the Fall term of 1971, and hence detailed development of the program is still in process at this writing. The program 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 will build upon the University's existing geographic focus on East Asia, Southeast Asia and the Pacific Islands, and integrate 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 will compare legislative roles in various countries with different economic growth rates and standards. It will also emphasize the economic implications of relatively weak and relatively strong legislative systems. The approach to these studies will be interdisciplinary to include political science, history, sociology, and utilization of the University's noted Asian languages program. Some of the specific matters to be 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 and Iowa.

Instructional Resources The instructional aspect of the program at Hawaii will be 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 will be 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.

An 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, which is 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. The program also proposes to assign graduate students as trained staff members to some legislatures in developing countries where such arrangements can be approved by the host country.

Research Resources The faculty and students participating in the legislative studies program will 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 call for appointments of Research Affiliates to the program—individual U.S. and foreign scholars from other institutions. In some cases they will be affiliated for activities at the University of Hawaii; in other cases their appointments will be for support for research and activities elsewhere which complement and enrich the program at Hawaii. They will 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 will endeavor 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 will be 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, will be analyzed.

Information Resources Applicable resources connected with the Hawaiian Legislative Reference Bureau, the Social Science Research Institute, the Eco-

nomic Research Center, and the various institutes of the East-West Center located on the Manoa campus are already well known to scholars. To supplement their working collections, plans are underway to collect additional legislative records of Asian and Pacific countries—including official proceedings, records of floor debates, committee hearings, and personal accounts of participants. These are to be accessioned by the University of Hawaii Library, and are to be permanently available for use by any interested scholar. The plans will be 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:

- 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 Korea 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 Polity (East-West Center Press, 1966)
- The Korea 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 in-

cludes specialization in legislative bill drafting, research and reference, and record keeping. Consultation services are an integral part of the Hawaii program.

31. UNIVERSITY OF IOWA Iowa City, Iowa 52240

Five-year grant \$265,000—csd 3294—authorized 11 August 1971.

Departments involved: Department of Political Science; Department of History and Sociology; College of Law.

University 211(d) Grant Officer: Dr. Gerhard Loewenberg, Department of Political Science.

Introduction The grant program in comparative studies at the University of Iowa is still in its initial stages of development, and thus is reported here only in summary and developmental terms. 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 will concentrate on legislative behavior variable 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 will examine 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 to be studied, analysis will be 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 will include 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 will be closely examined. Departmental emphasis will be provided primarily by the departments of Political Science and History.

A principal component of the program at the University of Iowa is to be 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 will be interdisciplinary, although centered in the Department of Political Science. A four-year graduate curriculum is to be established, specifically designed to train U.S. and foreign students in legislative research. The instructional program will include 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 will be associated directly with research in which faculty members are engaged through the Comparative Legislative Research Center. Students will spend up to one year in field research. Foreign scholars expert in the legislative process in their own

countries will also be involved in the teaching program, will hold visiting appointments at the University and will participate in supervising field research and in working with faculty to help design research assignments. Fellowships for graduate students specializing in comparative legislative studies will be 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 will be offered next year, in which five faculty members, graduate fellows in the comparative legislative research program and foreign scholars will 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. Full-time 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, plans to establish 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 TRIAL information retrieval system.

Another important ingredient of the research aspect of the program at the University of Iowa is a plan to enlist individual U.S. and foreign scholars as Associates in the teaching and research functions at Iowa.

Consulting Services As the program on Comparative Legislative Studies develops, the University of Iowa plans to provide 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 will also be extended. Such

services will, of course, be 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

Separate Grants in Economic, Social and Political Development and Modernization

32. UNIVERSITY OF MICHIGAN
Center for Research on Economic Development
Ann Arbor, Michigan 48104

Five-year grant \$675,000—csd 2547—authorized 20 November 1969.

Departments: Center for Research on Economic Development (CRED) and Department of Economics.

University 211(d) Grant Officer: Dr. Elliot J. Berg, Director, CRED.

Introduction 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 polity and development in Africa with special emphasis on Francophone areas." The Center has been in existence since 1960; at present close to fifty percent of its core budget is provided by the grant. Its overall mandate is, of course, more extensive than the specific purpose of the grant.

Although the Center is primarily a research and consulting instrument, four of its present eight professional Associates hold joint appointments in the Department of Economics, and one Associate is jointly engaged with University's Center for Population Planning. Two members of the Center's professional staff perform major administrative roles as Director and Deputy Director; there are two Associate Directors as well. At AID/Washington the grant program is monitored by the Office of Technical Assistance Coordination of the Bureau for Africa.

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 polity issues, and industrial relations; (c) regional economic cooperation, and (d) industrialization and expert policies.

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.



Among the more important instructional activities related to the subject area is the Seminar on Economic Development which functions as a workshop on development policy with a focus on Africa. Topics usually include: (a) international trade including the theory and measurement of export promotion, changing views on the role of exports, and effective protection; (b) employment, unemployment, migration and wage policy; and (c) planning and economic policy in specific country situations.

Special seminars, group discussions, and various multidisciplinary lecture series add to the instructional resources. 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. A special series of seminars on export sector problems was also presented in a recent year, as was a similar series on "Rural Development and the 'Quality' of Economic Growth." Other interdisciplinary group discussions covered urban planning and rural-urban relationships, the teaching of development economics, and the methodology of the social sciences applied to developmental problems. Visiting lecturers from various parts of the world also present special topics. Altogether nearly a hundred special discussion and lecture sessions relating to economic development are presented during the academic year; most of them are student-related and some of them student-generated.

In a recent year CRED-channeled financial support was available to 41 graduate students in various degrees depending upon need and the availability of other resources. Five of these were students from Africa, 28 from the U.S. and the remainder from other countries. Of the total, 28 were appointed as Research Assistants and 13 were awarded Fellowships. The substantive areas in which recent graduate students have assisted staff on problems relating to Africa include:

Labor mobilization in Morocco

Changes in export earnings in African countries
Simulation model of South Africa's apartheid policy
Wage structure in the public and semi-public sector of Morocco
Forest industries' contribution to economic development in Nigeria
Impact of rubber on the Liberian economy
Analysis of Tunisian exports to France and Germany
Industrialization policies in Tunisia
Public housing in Kenya
Anthropological study of Nigerian Tobacco Company workers
Economic effects of discrimination under South Africa's apartheid policy.

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.

Substantive areas in which the Center's research efforts merit special identification include the following:

1. LDC exports and export policies, including the analysis of export projections and the measurement of impact to economic policies on export performance.
2. Labor mobilization, resettlement schemes, and rural-urban migration; particular attention has been given to migration in West Africa.
3. Evaluating social sector expenditures, particularly with regard to health and education.
4. Rural development, including government rural development public works

programs, with special attention to Morocco.

In addition to student assistance to faculty research mentioned above, dissertation research is frequently carried out abroad under Center auspices. In a recent year eight students were abroad for dissertation research, six of them in Africa. Their dissertation topics and location illustrate the general character of graduate student research:

Natural Resource (Forestry) Economics:
Nigeria
Economic Relations between Botswana,
Lesotho, Swaziland and the Union of
South Africa
Economics of Education and Labor Mar-
kets in Kenya
Trends in Non-farm Employment in the
Philippines
Private Large Scale Foreign Investment
Decisions: An African Case Study—
Tanzania
Industrialization Policies and Export
Growth in Tunisia
Anthropological Study of Nigerian Tobac-
co Company Workers
Regional Aspects of Development in
Iran.

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 in 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) 32,168 development plans from 74 less developed countries on microfiche,
- (b) 8,000 government documents from less developed countries, three-fourths of them from Africa,

- (c) subscriptions to over 150 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. Most of the material in the Library has now been reclassified, using the Library of Congress card system.

An Acquisitions List of the CRED Library is issued monthly and may be available on special request. Several brief bibliographies of holdings, on such subjects as the Nigerian civil war, have been prepared. The Library has actively pursued contracts with other libraries and centers for exchange of both original and duplicate acquisitions. Through the University of Michigan General Library, the CRED Library participates with interlibrary loan service with any library in the United States, and also maintains a relationship with the Center for Research Libraries in Chicago.

The CRED Library administers the mailing lists of CRED Discussion Papers and Reprints, an effort which has led to exchanges with a variety of development centers and institutes in a number of countries abroad. At least twenty CRED Reprints have been issued to date, and nearly the same number of CRED Discussion Papers. Inquiries concerning lists of titles should be addressed to the CRED Library. The mailing list for such papers is now in excess of 250, half of which are research institutions.

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 participation in a Conference on Development Strategy requested by the Liberian Government. Other

examples of AID consultation services have included participation in the studies of the Nigeria Policy Review Team and advisory services to the Vihiga Rural Development Project in Kenya.

The Center has also provided faculty and "Junior Scholars" (Ph.D. candidates) to several universities overseas, including the University College of Kenya, the University of the Philippines, and the University of Thailand. This program of overseas faculty assignments is under 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.

33. MIDWEST UNIVERSITIES CONSORTIUM FOR INTERNATIONAL ACTIVITIES, Inc.

Five-year grant \$1,000,000—csd 2958—authorized 1 July 1971.

Member universities: Indiana University, University of Illinois, Michigan State University, University of Minnesota, and the University of Wisconsin.

Program Director: Dr. Davis B. Bobrow, Quigley Center of International Studies, 1246 Social Sciences Building, University of Minnesota, Minneapolis, Minnesota 55455.

Introduction This separately incorporated consortium known by its acronym MUCIA was organized in 1964 with Ford Foundation support to help its member institutions provide more effective technical assistance abroad and to maximize the impact of overseas activities by strengthening the international emphasis of courses and research programs on the respective campuses. The 211(d) grant program to MUCIA, however, was only inaugurated in the latter part of 1971. Consequently its program is still in the process of formulation at this writing. This fact, and the multi-institutional character of the organization, necessarily limit the report

of its resources and services herein to overall generalizations.

MUCIA's aim is to develop the organizational machinery for orchestrating the academic manpower resources of the five member universities, with their 84 colleges and 537 departments, in order to expand international development services, particularly in institution building and technical assistance methodology. Toward this end it coordinates training and research programs of the members. A portion of the 211(d) grant resources will be used to establish a documentation center that will be a source of documents, citations and reviews of research related to institution building and technical assistance methodology.

Through MUCIA the member universities are able to improve the quality of their overseas operations through support of faculty research, improved staff recruitment by a salary guarantee program for funding additional staff positions, and by grants to finance overseas dissertation research of advanced graduate students. MUCIA also supports more effective feedback into campus academic life through support of research by returning

faculty, graduate student internships, exploratory travel, and inter-university seminars and symposia. Resources of the 211(d) grant are to be used primarily for conceptual research related to the effectiveness of donor interventions in the LDC and leading to prescriptive problem solutions. AID monitoring of this grant is the responsibility of the Office of Program and Methodology of the Technical Assistance Bureau.

Instructional Resources Each of the five MUCIA universities offers standard graduate degree programs in academic disciplines related to MUCIA objectives, in area studies, and interdisciplinary programs related to institution building and technical assistance methodology. The Office of International Programs at each university can supply detailed information on the appropriate instructional resources and programs at each campus, as well as information on tuition, scholarships, and grants. A few of these resources have been described in relation to other 211(d) grants to four of the five universities in the Consortium—Illinois, Michigan State, Minnesota, and Wisconsin. Short courses and non-degree training programs relating to institution building and technical assistance methodology in international development are also available in the five member universities.

The MUCIA machinery provides ways for students enrolled at one university to take advantage of specialized resources of the other member schools. Through its Councils on International Communication, Population, International Health, and Education, MUCIA encourages both faculty and student communication within the Consortium network. Support for overseas research by both faculty and graduate students is available.

Research Resources Overseas research opportunities available to MUCIA scholars include a number of development projects undertaken by the five universities and the Consortium itself. At least 69 major programs in Latin America, Africa, Asia, Europe and the Near East are active at

this time. The range of activities is wide, and includes curriculum and faculty development at secondary and tertiary education institutions, research in crop development and agricultural practices, simulation and long-range planning groups, faculty and student exchange programs, and training programs. Collaborative research receives particular emphasis.

The MUCIA institutions pool resources on a variety of overseas assistance projects. In recent years such projects have included a basic sciences exchange program with the Agrarian University at La Molina, Lima, Peru; teaching, training and research programs with the National Institute of Development Administration at Bangkok, Thailand; consultative assistance on long-range educational planning in Korea; and assistance to an Indonesian consortium of agricultural faculties on agricultural education. However, individual or small group research projects constitute the bulk of MUCIA overseas research activity.

Information Resources Each of the five MUCIA universities maintains extensive special collections, libraries and computer facilities. The area studies programs at the five schools have resulted in exceptional area libraries, and one of the Consortium activities has been to send knowledgeable faculty members on overseas book buying and document collection trips to enrich these collections.

The Documentation Center authorized under the 211(d) grant undertakes responsibility for preparing bibliographies in the areas of research supported under the program, and of making these available to other scholars and to various aid agencies.

Consulting Resources MUCIA represents an extensive manpower resource which can provide either long- or short-term consultant services in many disciplines, ranging from engineering to agriculture, from education to public administration, and encompassing the whole span of development-related professional interests. Each of

the member universities has many faculty members experienced in international development activity. Specific inquiries may be

channeled through the Program Director. An extensive brochure on "MUCIA Overseas Projects" is available through that office.

34. SOUTHERN ILLINOIS UNIVERSITY
Center for Vietnamese Studies
Carbondale, Illinois 62901

First-year grant \$1,000,000—csd 2514—authorized 11 July 1969.

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.

University 211(d) Grant Officer: Dr. John Laybourn, and Grant Program Directors; Dr. Gene Hsiao, Edwardsville Campus and Dr. H. B. Jacobini, Carbondale Campus.

Introduction 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 University's 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.

An annual public lecture—covering such subjects as Vietnamese literature, arts, history, etc.—adds 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 also 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. Thus far, actual publication of scholarly works has been limited to Nguyen-Dinh-Hoa's *Colloquial Vietnamese*.

Consulting Services The University's history 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 interests and problems. Specific inquiries should be addressed to the Director of the Center.

35. TUFTS UNIVERSITY
The Fletcher School of Law and Diplomacy
Medford, Massachusetts 02155

Five-year grant \$700,000—csd 1929—authorized 31 May 1968;
Supplemental \$300,000 authorized 30 June 1970.

Departments involved: International Development Studies Program, involving the disciplines of economics, political science, international law and organization.

University 211(d) Grant Officer: Dr. Robert West, Director of International Development Studies.

Introduction 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, includes 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 subjects 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-Level 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 Zaier in Kinshasa (Congo) and with Haile Selassie University in Addis Ababa, 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 reprinting 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.

Educational Development

Two of the 211(d) 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. Both programs are multidisciplinary, but each is concerned with objectives and processes of a different character.

The Florida State University program is committed to the development of educational technology adaptable and useful to the special educational problems of developing countries. The UCLA program, with a geographic regional commitment to Latin America, is primarily committed to the development of multidisciplinary competence for the analysis of alternatives to traditional educational programs.

While the two programs are not organically interrelated, the studies and relationships they generate, and their program content, complement each other. Breakthroughs in both educational technology and analytical techniques, the complementary goals of the two programs, are urgently needed in much of the developing world if education is to become a prime instrument of the development process.

36. UNIVERSITY OF CALIFORNIA, LOS ANGELES Latin American Center Los Angeles, California 90024

Five-year grant \$600,000—csd 2825—authorized 24 June 1970.

Departments involved: The Latin American Center is organized around eight Deans' Advisory Committees comprising 50 faculty members representing eight schools and colleges.

University 211(d) Grant Officer: Dr. Thomas J. LaBelle, Coordinator for Research on Latin American Education.

Introduction 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 is being planned for the 1972-73 academic year which will bring together specialists from the Americas. It will, among other objectives, serve 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. A two-week short-course involving Venezuelan educators was held at UCLA and was concerned with planning community colleges in 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-researcher-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 full-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 participation in the Ford Foundation's Chile-California project conducted with assistance from the Latin American Center add addition-

al 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 annually 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 Educa-

tion/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.

37. FLORIDA STATE UNIVERSITY

Center for Educational Technology
415 N. Monroe Street
Tallahassee, Florida 32301

Five-year grant \$1,000,000—csd 2945—authorized 28 April 1971.

Department involved: Center for Educational Technology, a multidisciplinary organ associated with the University's College of Education.

University 211(d) Grant Officers: Dr. Robert M. Morgan, Dr. Robert K. Branson Center for Educational Technology.

Introduction Since this grant program has been in operation less than a year at this writing, information included herein is necessarily abbreviated, pending further development of the program.

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.

Science and Technology

The two 211(d) programs in this category have been among the most recent to receive funding, and are therefore necessarily described here in somewhat abbreviated fashion, since the details of each have not yet been fully implemented.

The transfer of technology to nontechnological societies has proved to be much more complex and difficult than was originally envisioned. The two programs described below are, indeed, based on this premise. Both thus necessarily involve a cross-disciplinary mobilization of resources for their tasks.

Although the two programs are not organically interrelated, they are complementary and mutually reinforcing. The Cornell University program on "Policies for Science and Technology in Developing Nations" emphasizes the study and identification of alternate national policies for implementing industrialization. The program of the Massachusetts Institute of Technology (MIT) emphasizes the study of the technological requirements, components and adaptations required for industrial development. Both, of course, include social and economic factors and emphasize the importance of institutional relationships in developing countries.

At AID/Washington the two programs are monitored by the Office of Science and Technology in the Bureau of Technical Assistance.

38. CORNELL UNIVERSITY Ithaca, New York 14850

Five-year grant \$580,000—csd 3158—authorized 11 August 1971.

Departments involved: Program on Science, Technology and Society (STS), College of Engineering; Center for International Studies (CIS); various instructional departments.

University program director: Dr. Edmund T. Cranch, College of Engineering.

Introduction The grant program at Cornell on "Policies for Science and Technology in Developing Nations" concentrates on the analysis and study of policies concerning the application of science and technology to developmental problems in low

income countries. It consists of 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 establishments of national policies in this area. It is hoped that at least one country in each of three major geographic areas—Africa, Latin America and Asia—will eventually participate as partners in the program with the University through central agencies or institutions.

Cornell's Program on Science, Technology and Society was established in the summer of 1969 to stimulate teaching and research on the interaction of science and technology with society. This program associates the

University's physical and biological scientists and engineers with social scientists to study the role of scientific and technological factors, and their social-economic implications, in public policy. The Center for International Studies provides the mechanism for extending the STS program internationally. An interdisciplinary faculty committee reviews problems in science policy, particularly the relationship of science and technological factors to international development.

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 are currently being taught at the University, even before the inauguration of the grant program. Examples include the following:

Science and Technology Relations among
Advanced Industrial Countries
Social Implications of Technology
Science, Technology and Public Policy
Transfers of Science and Technology to
Developing Countries
Seminar in International Business and Eco-
nomic Policy
Administration of Public Operations
Abroad.

The current brochure on the STS Program at Cornell lists 67 courses in the different departments and colleges which have a relationship to the program and its international dimensions.

New graduate courses being planned include at least one in the subject area which

will be particularly designed for students from less developed countries. Another will focus on issues of science policy, strategy, and organization.

The program expects to make training of an applied nature a key feature of its activities. Such training will typically include working with faculty and visiting professors on both research and teaching projects as well as opportunities for research overseas whenever feasible. Fellowships will be available to qualified students, and overseas research assignments will be in an internship capacity 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 will emphasize 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 of systematic analysis is a crucial limiting factor in the development of indigenous scientific and technological capability.

It is anticipated that research studies will concentrate on the following:

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 therefor.
4. Incentives, sanctions and rewards for inducing local scientists and technolo-

gists needed 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, expedited by 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 Cornell's library on science and technology, to be expanded by the grant program, is housed in the STS program facilities. 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 that “Cornell Program on Science, Technology and Society”—should be addressed to the STS Program Director, 628 Clark Hall, at the University.

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—the Southeast Asia Program, the Latin American Program, the International Population Program, the International Agricultural Economics Program, the Tropical Soils Program, the International Legal Studies Program. In the College of Engineering itself, approximately forty 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.

More specific information on consulting services contractually available in Science and Technology will be available as the program develops.

39. MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, Massachusetts 02139

Five-year grant \$900,000—csd 3360, authorized 15 October 1971

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.

Chairman of Institute Steering Committee for

the Grant: Dr. J. P. Ruina, Department of Electrical Engineering.

Introduction 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 devel-

oping countries. The initial effort under this program will be 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, communication 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. will build 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 will be used to augment awards and fellowships of both foreign and American students working in this field. Multidisciplinary courses will be 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 will also be provided for strengthening library collections, which will, of course, be open to those not at M.I.T. as well.

The Grant will provide 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 will be developed in order to establish better communications between academic contributors and practitioners in the field. The fullest participation possible from people in developing countries will be sought.

Appendix A

FUNDING OF THE INSTITUTIONAL GRANTS PROGRAM, 1967-72

	<i>5-year grant</i>
<i>International Agricultural Economics Panel</i>	
Cornell University (1970)	\$ 240,000
Iowa State University (1970)	375,000
Michigan State University (1970)	625,000
University of Minnesota (1970)	800,000
Southern University (1972)	500,000
Virginia State College (1972)	500,000
	\$ 3,040,000
<i>Council of U.S. Universities for Rural Development in India</i>	
University of Illinois (1968)	\$ 200,000
Kansas State University (1968)	200,000
University of Missouri (1968)	200,000
Ohio State University (1968)	200,000
Pennsylvania State University (1968)	200,000
University of Tennessee (1968)	200,000
	\$ 1,200,000
<i>Council of U.S. Universities for Soil and Water Development in Arid and Sub-Humid Areas</i>	
University of Arizona (1969)	\$ 350,000
Colorado State University (1969)	750,000
Utah State University (1969)	750,000
	\$ 1,850,000
<i>Tropical Soils Science Group</i>	
Cornell University (1970)	\$ 500,000
University of Hawaii (1970)	500,000
North Carolina State University (1970)	500,000
Prairie View A & M College (1970)	500,000
University of Puerto Rico (1970)	500,000
	\$ 2,500,000
<i>Aquaculture and Marine Resources</i>	
Auburn University (1970)	\$ 800,000
University of Rhode Island (1969)	750,000
	\$ 1,550,000

Land Tenure Center

University of Wisconsin (1969) \$ 1,500,000

Health and Population Planning

The Johns Hopkins University (1968) \$ 1,800,000
University of Michigan (1968) 1,250,000
University of North Carolina (1967) 2,400,000
\$ 5,450,000

Law, Development and Modernization

Stanford University (1971) \$ 700,000
Yale University (1969) 1,000,000
\$ 1,700,000

Comparative Legislative Studies

Duke University (1971) \$ 500,000
University of Hawaii (1971) 235,000
University of Iowa (1971) 265,000
\$ 1,000,000

*Separate Grants in Economic, Social,
and Political Development and Modernization*

Tufts University (1968, supplement 1970) \$ 1,000,000
University of Michigan (1969) 675,000
Southern Illinois University (1969) 1,000,000
Midwest Universities Consortium for
International Activities, Inc. (1971) 1,000,000
\$ 3,675,000

Educational Development

University of California at Los Angeles (1970) \$ 600,000
Florida State University (1971) 1,000,000
\$ 1,600,000

Science and Technology

Cornell University (1971) \$ 580,000
Massachusetts Institute of Technology (1971) 900,000
\$ 1,480,000

TOTAL, 211(d) Grants to 31 May 1972 \$26,545,000

Appendix B

PROJECT CRITERIA FOR DETERMINING ACCEPTABILITY OF GRANT PROPOSALS AND THE APPROVAL PROCESS

Criteria and Operations The AID Manual Order for the Institutional Grants Program specifies seven “project criteria” which determine the acceptability of grant proposals. These may be digested as follows:

1. The project must be directed toward developing special competence in an area of skill or knowledge that is directly related to the program needs and responsibilities of AID. Since AID is responsible for identifying the priorities and selecting the institutions best equipped to respond to them, prior consultation with AID is necessary.

2. The institution must be able to ascertain that it already has the potential to produce the work proposed, and grant funds are not to be used as seed funds to germinate capacity where none presently exists. Generally a multi-disciplinary capability and approach to the problem area is strongly encouraged if not required.

3. The grant project must be designed to establish or strengthen an outstanding “center of competence” within the recipient institution in one of three basic formats:

- (a) Dealing with a professional or technical discipline or subdiscipline (or a combination of disciplines) especially relevant to the needs of less-developed countries, or
- (b) Dealing with a specific geographic area or country or a particular sector of development in that area or country, or
- (c) A combination of the two above.

4. The institution must furnish assurances that it will commit itself to support the development of the proposed institute, center or program, and this assurance must be provided by its top administration rather than from individual deans or department heads. Matching funds are not necessarily required, but adequate physical facilities are the responsibility of the institution and are not to be paid for out of grant funds. The institution must also be willing to prepare special curricula, recruit and train personnel, and otherwise fully integrate the program into the institution’s academic and research life.

5. The proposal must have built-in research, training, and advisory components, and a plan for sharing knowledge. The capacity developed by the project should enable the institution to:

- (a) Develop a capability in research
- (b) Develop a capability in training

(c) Put itself in a position of providing relevant consulting services, specifically to AID on request.

6. The proposal must reflect the long-term nature of the program by including at least a five-year projection of its goals and activities. Plans for future sources of support after AID assistance is phased out should be included also.

7. Grants are made and funds are obligated for a five-year period, with the possibility of another five-year extension as a maximum. At the end of each year, progress under the grant is formally reviewed and evaluated by the Agency.

Funds under 211(d) are provided as grants, not contracts, to institutions with demonstrated public interest, competence, and integrity to carry out their roles in this process without governmental management of the details. AID is responsible for the granting process, for helping to effect correlation between related programs, and for evaluation at stated periods; but it is the responsibility of the institution itself to manage the project in such fashion as to optimize achievement of agreed upon objectives. If, in the evaluation and auditing process it becomes apparent that any expenditures under the grant are not fully in accord with the grant objectives, the AID Administrator may require that the money so spent be returned to the corpus of the grant, or he may terminate the grant.

Grant Approval Process After preliminary discussions between officials of AID and those of an institution interested in submitting a grant proposal, the institution is responsible for developing the formal proposal. It follows a standard pattern and format, detailed in the AID Manual Order and covering the points mentioned above.

The formal proposal is submitted to AID's Office of Research and University Relations in the Technical Assistance Bureau. This office reviews the proposal and manages the review processes which include close study of the proposal by representatives of the regional bureaus of AID as well as review by scientists from outside the Agency. The proposal is studied in depth, assessing its development priorities, the benefits which may accrue to regional and inter-regional concerns of the Agency, the technical capacity and competence of the proposal source, and related long-range policy and programming implications. Changes in the proposal may also be recommended to the institution.

When a favorable review process is completed, the final decision on authorization is made by the Administrator of the Agency, taking into account the availability of funds which are normally obligated for a five-year period. The grantee must also agree to take all reasonable steps to insure equality of opportunity in its employment practices under the grant, without regard to race, religion, sex, color or national origin, consonant with the Civil Rights Act of 1964.