

MULTIPLE-USE PLANNING AND MANAGEMENT OF NATURAL
RESOURCES OF ARID/SEMI-ARID DEVELOPING NATIONS
(931-0159)

University of Arizona 211(d) Fourth Year Review

March 2-3, 1978

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Part I - SUMMARY OF FINDINGS AND RECOMMENDATIONS

The Review Team has divided its comments into two parts: first, those that relate to the University of Arizona's overall performance in the 211(d) program, and second, their performance in their activities in Niger. We have made this division because the Niger activity has taken on more of the character of a development project than a strictly 211(d) activity. Also, there have been some problems with the Niger activity, whereas the overall 211(d) for the most part has worked out quite well.

211(d) Activities:

The University of Arizona has made a strong effort to develop first-hand experience in addressing development problems in developing countries. They have emphasized the involvement of faculty and students in activities in the arid/semi-arid regions of Ghana, Niger, Peru and Mexico which have been directed toward establishing the University's response capability in the area of multiple-use planning and management of natural resources in arid and semi-arid regions of developing countries.

Arizona instituted special French language courses for its 211(d) participants to facilitate working with Francophone Sahelian countries. This has proven to be effective for many of Arizona's 211(d) people and an important effort on Arizona's part. Because of Arizona's proximity to Mexico, Spanish is a common second language at the University, and, therefore, special language courses in Spanish were not included in the 211(d) program.

Arizona has made a strong effort to develop activities that are truly interdisciplinary and has been quite successful in doing so. Faculty and students from a broad spectrum of departments have participated in numerous activities in which they have been required to work closely with one another and to incorporate each other's points of view in their design and planning efforts and in actually carrying out project ideas. However, certain departments of the University like Law, Architecture, and Nursing have chosen not to participate in the 211(d) program (see Table 1). As a result, certain specialities are not covered by the team's composition. This has not been a major problem as is evidenced by the overall participation of many of Arizona's Offices, Colleges and Departments (see Table 1).

Commonly, university teaching departments do not reward faculty participation in overseas activities, and, in some cases, it is actually a detriment to a faculty member's obtaining tenure. The promotion and tenure problem was seriously considered by Arizona at the start of the 211(d) in order to reduce the possibility that the problem would jeopardize the effectiveness of the entire program. An Arid Lands Natural Resources Committee has been instituted in the University structure directly below the Vice President for Research. The Committee will see that when the 211(d) ends, the people involved in these 211(d) activities, and in future similar overseas arid lands activities, will receive due credit for their work so that it can be used to support their promotion and their gaining tenure.

The Management Committee takes additional precautions to assure that new faculty wishing to participate in 211(d) activities receive their

TABLE 1

List of University of Arizona Offices, Colleges
and Departments which have participated in the 211(d)

Office of the Executive Vice President -

Optical Sciences Center

Office of the Executive Vice President/Office of Interdisciplinary Programs -

Latin American Center
Office of International Programs

Office of the Vice President for Research -

Environmental Research Laboratory
Office of Arid Lands Studies

College of Agriculture -

School of Renewable Natural Resources
Arizona Cooperative Wildlife Research Unit
Department of Agricultural Economics
Department of Nutrition & Food Science
Department of Soils, Water & Engineering
Council for Environmental Studies
Office of International Programs

College of Architecture -

(No Departments)

College of Business & Public Administration -

Department of Economics
Department of Geography, Regional Development, &
Urban Planning
Department of Management
Department of Management Information Systems
Department of Marketing
Department of Public Administration

College of Earth Sciences -

Department of Geosciences
Department of Hydrology & Water Resources
Water Resources Research Center

College of Engineering -

Department of Civil Engineering and Engineering Mechanics
Department of Nuclear Engineering
Department of Systems & Industrial Engineering
Department of Electrical Engineering

Graduate College -

College of Law -

(No Departments)

College of Liberal Arts -

Department of Anthropology

Arizona State Museum
Bureau of Ethnic Research

Department of Atmospheric Sciences
Department of Ecology & Evolutionary Biology
Department of Oriental Studies

Near East Center

Department of Physics
Department of Political Science

Institute of Government Research

Department of Psychology
Women's Study Committee

College of Medicine -

Department of Family & Community Medicine
Department of Pediatrics
Department of Surgery

College of Mines -

Department of Mining & Geological Engineering

College of Nursing -

(No Departments)

department's advance approval and its understanding that such activities are significant and count toward the faculty member's tenure. In cases where departments do not demonstrate an appreciation for such activities the 211(d) Management Committee discourages the individual's participation.

Consideration was given to the possible transfer of Arizona's 211(d) to AID Africa Bureau because many of the lesser developed countries having arid/semi-arid environments are in the Sahel, and because Arizona had developed most of its overseas activities in the Sahel region. Discussions between Arizona and the Africa Bureau prior to the review suggested such a transfer might be made. Ultimately, the Africa Bureau decided against the transfer and this decision was mentioned during the review.

It was assumed in the grant design that there would be a gradual increase in the 211(d)'s utilization during the grant's lifetime, and that the utilization by AID and other donors would provide significant support to this special arid-lands center. In fact, to date AID's utilization of Arizona competence developed under the 211(d) has been minimal; the level of utilization by other donors has not been great. One reason for this, the discussion suggested, has been that representatives from Arizona do not visit AID's Washington offices often enough to learn of programs and projects for which Arizona might propose assistance. The cost of travelling between Tucson and Washington has precluded frequent visits to AID/W by Arizona 211(d) people.

REVIEW TEAM RECOMMENDATION: that Arizona 211(d) Management, on their next visit to AID/Washington, meet with DSB's Utilization Office to try to develop improved mechanisms for bringing Arizona's expertise to the attention of AID's Regional Bureaus, Missions, and other donors.

REVIEW TEAM RECOMMENDATION: That Arizona might use its arid lands' interdisciplinary expertise to develop training courses for donors involved with LDC environmental and natural resource planning and management.

State's OES has used Arizona's expertise with great satisfaction in preparation for and participation in the UN Water Conference and the U.N. Desertification Conference. Bill Long, OES/ENP/EN, states that, at various international meetings he has attended, Arizona's name commonly is mentioned as the recognized center of expertise in arid lands in the U.S. and one of the major centers of its type in the world.

It was assumed that during the life of the grant Arizona would develop non-211(d) grant sources of funding sufficient to sustain the core institutional capacity engendered by the grant. Thus far, major non-211(d) sources of funding have not developed to support the Arizona program.

Arizona has chosen to place major efforts in developing first-hand knowledge and expertise in its faculty and students in LDC natural resources management and planning problems. Consequently, Arizona has fielded interdisciplinary teams to work in such countries as Peru, Niger, Ghana, and Mexico during the course of this grant. By doing so, the 211(d) team members have brought common LDC problems into classroom discussions and projects at Arizona in a very real way. These field activities for the most part have been very successful; some difficulties of the Niger experience are discussed below in detail. The Review Team was, on the whole, very impressed with the initiative shown by Arizona in implementation of its work and its effort to address problems in LDCs.

Niger Activities:

Arizona has found that fielding such interdisciplinary teams has been more costly than had been anticipated when the grant was designed. Because Arizona felt that the University and its students would benefit the most from practical LDC experiences, major support was directed to these activities. This desire to participate directly in LDC field activities on a large scale led to funding and other problems in the Niger exercise.

A large student and faculty effort was placed on this single activity and the required 211(d) support also was large. Arizona's involvement in Niger took on more of the nature of a project activity than that of a 211(d) activity. The goals of the Niger study as seen by Arizona and by the Government of Niger (GON) were not the same even though the two spent time during the initial design working out plans that supposedly each party understood. The GON expected Arizona's people to spend long periods in Niger working with their counterparts, however, Arizona's visits were short but frequent. The discontinuous nature of Arizona's activities was disconcerting for their Nigerian counterparts.

The GON's expectations centered around concrete outputs from Arizona and the GON believed that Arizona would provide manpower to carry out tasks as an extension of various government departments. Arizona did not view itself in this light. Arizona felt it was working in cooperation with the GON on problems of mutual interest, that the GON understood the full meaning of a 211(d) grant, i.e., that Arizona was not to be considered merely as a man-power resource for the GON.

Dr. Jack Johnson, the Director of the 211(d) program, encouraged the Arizona team to be responsive to any new GON requests without concern for available support funds. An original assumption of this grant was that utilization of Arizona's expertise would increase and that it would provide additional support for the entire program. Support outside of the 211(d) did not materialize as Dr. Johnson had assumed, and as a result Arizona used up the funds allocated for its fifth year of the grant. During various visits, Arizona made additional promises to the GON on various types of work Arizona would carry out.

Throughout the Arizona-GON dealings, a friendly relationship has existed between the two parties. In order to maintain this relationship and to avoid embarrassment to the University of Arizona and the U.S. Government it was decided by RDO/NIAMEY and Arizona that representatives from the GON, USAID Niamey, and the University of Arizona should meet to design a sound, realistic work program which Arizona could accomplish during the fifth year of the grant. The Africa Bureau would try to secure funding for Arizona to insure the completion of the work, and Arizona would be expected to share in at least partial support of salaries for tenured professors involved in the work (See attached letter, Annex E.

Arizona has accomplished the grant purpose and generated the proposed outputs in four years instead of five (see Part B of report), in spite of management problems.

REVIEW TEAM RECOMMENDATIONS: (1) that no additional funds be added to the 211(d) grant because of Arizona's success in generating outputs specified in the original grant; (2) that the grant termination date remain unchanged.

Arizona's Drs. Matlock, Johnson and Seale, after being told of the Review Team's findings said they felt relieved at not being given additional funds. They felt that this would oblige Arizona to try harder to develop contracts with various parts of A.I.D. and with other donors. They too believe the 211(d) has been a success and that it is time for them to sell their special arid lands' expertise.

PART B - REVIEW PROCEDURE AND OUTPUT ANALYSIS

The following Review Team met with faculty, students and staff of the University of Arizona in Tucson, Arizona, March 2 and 3, 1978, to conduct the fourth-year comprehensive review of the 211(d) program on Multiple-Use Planning and Management of Natural Resources of Arid/Semi-Arid Developing Nations.

Mr. Jay Johnson, USAID Mission Director Niamey, Team Leader

Mr. Thomas Eliot, DS/PO, 211(d) specialist

Dr. Gilbert Corey, DS/AGR, irrigation engineer

Dr. Alan Hoben, PPC/PDA/CP, anthropologist

Ms. Carol Ulinski, AFR/SFWA, environmental adviser

Dr. Walter Parham, DS/ST, geologist, and current Project Manager

Meetings were held at the Office of Arid Lands Studies all day March 2. Dr. Jack Johnson, Director of the 211(d) program, Dr. Gerald Matlock, Chairman of the Program's Management Committee, and other members of the Management Committee presented program base-line data supporting the grant's

original planned outputs. During the day numerous participants in the 211(d) grant presented short summaries of specific parts of this interdisciplinary program. Presentations continued the following day and ended at noon.

The Review Committee met separately during the early afternoon of the second day to discuss the participants' presentations and various grant documents. They agreed to present an oral summary of the evaluation of Arizona's performance, accomplishments and short-comings in carrying out the purpose of the grant. Later the same afternoon, the Review Team met with the University of Arizona's Drs. Johnson, Matlock and Seale to report on the review findings. Team Leader, Jay Johnson, reported on the Team's assessment of Arizona's activities carried out in Niger, and Walter Parham reported on the Team's evaluation of the overall 211(d) program.

Grant Purpose

The purpose of this 211(d) grant is "to assist the University of Arizona to establish an institutional response capability in the area of multiple-use planning and management of natural resources in arid and semi-arid regions of developing countries. The Program will focus on concepts and technologies for inventorying, assessing, and managing the resource base in a manner that optimizes overall benefits over the long term. Special importance will be attached to the socio/economic, institutional, legal, and public policy aspects of resource management."

Grant Goal

"The long range goal toward which the Program will contribute is the upgrading of developing country capabilities for assessing and

implementing the best use of natural resources, including broader application of more effective techniques for identifying and appraising resources; improved planning and management strategies and procedures based on concepts of integrated, multiple-purpose resource use; and environmental protection. Such a goal is dictated by the growing world-wide awareness of the finite nature of the land and natural resource base, and of the social and environmental costs associated with many traditional single-purpose resource development activities."

Planned Major Outputs of Grant

Five major planned output categories of the grant are:

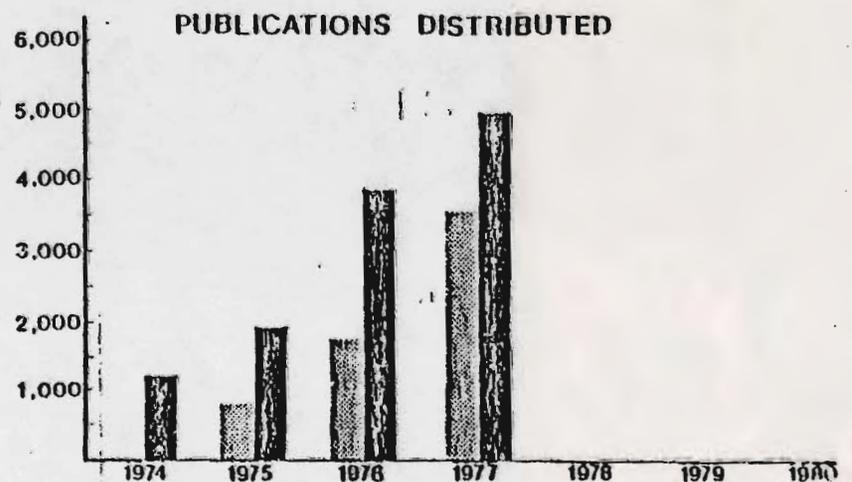
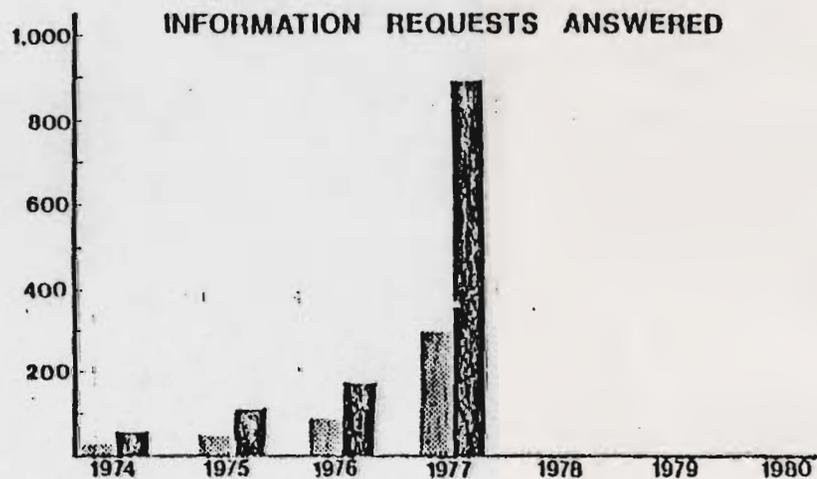
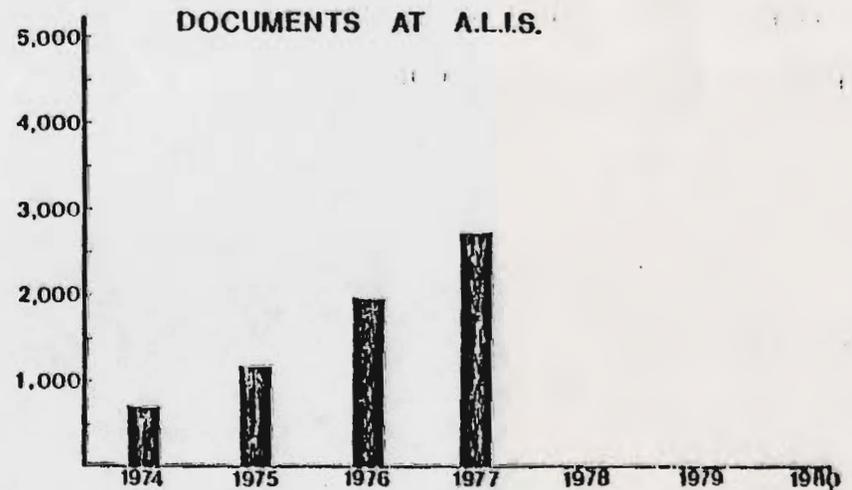
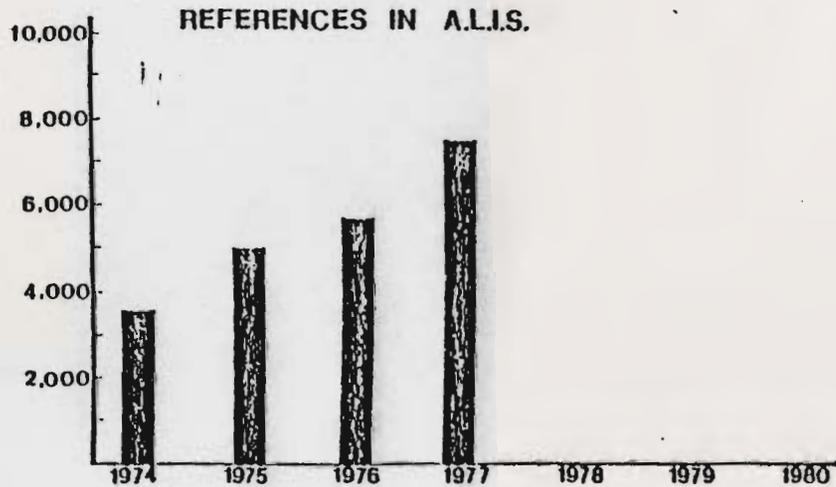
1. information system
2. new education and training capability
3. increased knowledge and expanded research capability
4. expanded advisory capability, and
5. institutional linkages.

Accomplishments in each of these categories follow:

1. Information system: This activity involves building upon the already existing computer-based Arid Lands Information System (ALIS) at the Office of Arid Lands Studies; the development of a catalog of natural resources expertise which will identify U.S. and foreign specialists or research groups; the publication of an international newsletter on all aspects of natural resources pertaining to arid/semi-arid lands; and research for the preparation of state-of-the-art reports.

Arizona has expanded the ALIS from the beginning of the 211(d) grant to include a large proportion of LDC arid lands information. A breakdown of the numbers of references, documents, requests and publications

ARID LANDS INFORMATION SYSTEM A.L.I.S.



COMPUTER RETRIEVALS CUMULATIVE

TOTAL SERVICES PER YEAR

ARID LANDS NEWSLETTER

TOTAL PUBS.

distributed is shown in Figure 1. ALIS is no longer funded through the 211(d) grant but rather is now funded separately by an AID grant which began in October of 1977 following a recommendation of the 18-month Review Team.

The present grant supporting ALIS is designed to encourage ALIS to become self-sustaining within three years or less so that the information system will expand and be available to AID and other development agencies and LDCs in the future. AID grant funding of ALIS for its expansion was a U.S. initiative at the U.N. Desertification Conference last year.

The development of a catalog of talent has proceeded slowly but has been augmented with new names. Verification of the information is a slow process as is the maintenance of up-to-date records on U.S. and foreign arid lands specialist and research personnel.

Arizona has published the seventh in its series of Arid Lands Newsletters which now is being distributed worldwide to some 600 individuals or institutions dealing with the problems of arid lands. The newsletter has carried some special papers by foreign researchers and Arizona researchers on various disciplines related to LDC arid-lands problems, such as duricrusts, and housing problems of the poor.

State-of-the-art reports on appropriate technology, desertification, application of technology to LDCs, and the impact of groundwater development in arid lands have been published by Arizona under the information activities. Another report on the utilization of rock phosphates as fertilizers in West Africa has just been published.

2. Education and Training Capability: This output is to ensure that the University's graduate degree programs are responsive to appropriate resource management concerns, and that special training opportunities exist for foreign resource specialists. Central to this purpose is the adaptation and integration of existing courses, and the development of new ones. Arizona has established a new Mineral Economics Program in the College of Mines as an output of the 211(d) grant. It was designed especially to benefit students from developing countries. The program will become a permanent part of the University's course offerings when the 211(d) terminates.

A permanent academic committee on Remote Sensing was created at the University of Arizona as a result of 211(d) activities. A formal minor in remote sensing has been instituted involving 11 departments and 24 course offerings ranging from photogeology to image processing.

Arizona has held a Technical Information Workshop in Ghana, a Remote Sensing Workshop and Systems Analysis Workshop in Peru, both linkage countries. A Remote Sensing Planning Workshop will be held this fall in Niger.

A series of weekly seminars open to all students and faculty have been held from the grant's beginning. The topics have been varied but have included special series on human resources development, infrastructure and resource development, international assistance programs some University of Arizona experience, multidisciplinary activities, desertification, application of technology in developing countries, environmental factors in development, nutrition in economic and social development,

(See Annex A)
and arid-lands housing / Seminar attendance averages 50 per lecture. Certain of the latest seminar subjects have resulted in published compilations. Presentations have been from University of Arizona faculty and students, other U.S. and foreign university faculty members, U.S. and foreign government agency staff, international organizations, and U.S. private industry. The Review Team attended one of these seminars on arid-lands housing as part of its review, and about 125 persons attended.

3. Increased knowledge and expanded research capability: Increased knowledge will result from work conducted at the University and in developing countries. Individual academic departments also conduct separately-funded projects abroad and the results of these contribute to the experience gained by the faculty involved and by the developing country. Such efforts are encouraged and assisted by the 211(d) program.

Arizona has initiated or supported a wide variety of projects directed toward this output area. Faculty representation in these projects is reflected in Arid Lands research findings and related studies presented at professional meetings by University of Arizona faculty members (see Annex B). Further, special new areas of study developed under this 211(d) grant included health, geology, sociology and housing only to mention a few (See Annex C for a more complete listing). Arizona's research capability in arid/semi-arid lands matters has been greatly expanded.

4. Expanded Advisory Capability: The major objective of this output is to enhance the competence of faculty for providing advisory services under negotiated separate funding arrangements and other organizations in

support of resource management programs. The grant document states that the evolution of this capability will be gradual, pending the emergence of a body of knowledge and a critical mass of staff members experienced and knowledgeable in the development sector.

Arizona's advisory capability has been underutilized up to the present even though they have been called upon for a few important tasks. Arizona has one three-year contract with AID for technical consulting services related to the Africa Bureau's Northeast Ghana Savannah Research Project. The University also assisted the U.S. Department of State in its preparations for and participation in the 1977 U.N. World Desertification Conference.

An original assumption of this grant was that utilization of expertise would increase and that it would provide additional support for the entire program. Major support outside of the 211(d) has not materialized.

5. Institutional Linkages: The University pursues three basic types of linkages: domestic, international, and LDC. Domestic includes AID, other 211(d) and AID contractors, universities, research institutions, and federal and state agencies involved in natural resources management. International linkages include specialized U.N. bodies like UNDP, UNEP, and FAO, and other multi-national organizations. Developing country linkages take two forms: "minor" linkages which involve informal exchanges of information and occasional visits; and "major" linkages which involve formal agreements with institutions in specific countries for joint research, training programs, and possible faculty exchange. Arizona's 211(d) linkages are listed in Annex D.

ANNEX A

Listing of Interdisciplinary Seminars Held between

Fall 1974 and Fall 1977

LISTING OF INTERDISCIPLINARY SEMINARS

Fall 1974 - Fall 1977

<u>Date</u>	<u>Speaker</u>	<u>Affiliation</u>	<u>Title</u>
Sept. 5, 1974 (Fall semester begins)	Herbert Carter	Office of Interdisciplinary Programs, The University of Arizona	"The AID Natural Resource Program"
Sept. 12, 1974	Lendell Cockrum	Dept. of Biological Sciences, The University of Arizona	"An Ecological View of the Sahel-Sudan Region"
Sept. 19, 1974	Waldo Tobler	Dept. of Geography, University of Michigan	"Relating Remote Sensor Data to Environmental Modeling"
Sept. 27, 1974	Gerald Matlock	Dept. of Soils, Water and Engineering, The University of Arizona	"A Framework for Agricultural Development Planning in the Sahel-Sudan Region"
Oct. 3, 1974	William Long	Office of Science and Technology, U.S. Agency for International Development	"The Application of U.S. Science and Technology to the Problems of Developing Nations"
Oct. 10, 1974	Philip Ogden	Department of Watershed Management, The University of Arizona	"Drought Analogies: Niger and the Papago Indian Reservation of Arizona"
Oct. 17, 1974	Donald Johnson	Department of Range Management, University of Sonora (Mexico)	"Range Improvement in Sonora, Mexico"

Oct. 25, 1974	Ali El Tom	National Research Council of Sudan	"The Drought and Food Shortage Problem in Africa"
Oct. 30, 1974	Allen Clark	Office of Economic Analysis, U.S. Geological Survey	"The Need for and Methodology of Mineral Resource Appraisals in Developing Nations"
Nov. 5, 1974	James Teer	Dept. of Wildlife and Fisheries Sciences, Texas A & M University	"Utilization of Wildlife Resources in Africa."
Nov. 14, 1974	Aaron Wildavsky	Graduate School of Public Policy, University of California, Berkeley	"Ten Rules for Coping with Information Systems in Resource Policy Planning"
Nov. 19, 1974	DeVerle Harris	Dept. of Mining and Geological Engineering, The University of Arizona	"Methods and Uses of Mineral Resource Appraisals in Lesser Developed Regions"
Nov. 26, 1974	Clark Bloom	Dept. of Public Administration, The University of Arizona	"Administering the Planning of Resource Development Programs in Developing Countries"
Dec. 5, 1974	Mitchell Seligson	Dept. of Government, The University of Arizona	"New Dimensions of Agrarian Reform in Latin America"
Dec. 12, 1974 (Fall semester ends)	David Llewelyn	British Petroleum Co., Ltd.	"Problems of Future Technological Development and the Oil Producing Countries of the Middle East"

Series on:

Human Resources Development

Jan. 30, 1975 (Spring semester begins)	Marsden Stokes	Department of Education- al Foundations and Administration, The University of Arizona	"Human Resource Development in the Less Developed Nations: Some Guides for Action"
Feb. 6, 1975	Freeman Wright	School of Social Sciences, California State College, San Bernadino	"Human Resources Developmen in the Central University of Ecuador: A Case Study"
Feb. 13, 1975	Ray Marshall	Center for the Study of Human Resources, University of Texas, Austin	"A Conceptual Framework for Analysis of Human Resources Development"
Feb. 20, 1975	Gaston Rimlinger	Dept. of Economics and Accounting, Rice University	"Administrative Training and Modernization in Zaire"
Feb. 27, 1975	M.I. Karenga	Dept. of Management and Administration, University of Dar-es- Salaam (Tanzania)	"Some Aspects of Manpower Development in Tanzania"

Series on:

Infrastructure and Resource Development

March 6, 1975	Ibrahima Fall	UNICEF/New York	"Planning and Programing for Children and Youths in the African Sahel"
March 13, 1975	Donald Wells	Dept. of Economics, The University of Arizona	"The International Finance System: Implications for Resource Development"

March 20, 1975	John Dale	Dept. of Special Projects, Southwest Research Institute	"Sulfur and the Surface Bond Construction Technique for Low-Cost Housing"
April 3, 1975	Boris Kozolchyk	College of Law, The University of Arizona	"Law as Infrastructure in the Development Process"
April, 10, 1975	Jack White	Science and Public Policy Program, The University of Oklahoma	"Infrastructure and Resource Development: The Case for Offshore Oil and Gas"

Series on:

International Assistance Programs:

Some University of Arizona Experience

4 April 17, 1975	John Fischer	Dept. of Agricultural Economics, The University of Arizona	"Rural Sector National Planning, Administrating and Project Preparation: The Cutting Edge of Develop- ment"
April 24, 1975	Gerald Matlock	Dept. of Soils, Water and Engineering	"The College of Agriculture/ Federal University of Ceara Program: An Example of University to University Technical Assistance Programs"
	Lamar Smith	School of Renewable Natural Resources, The University of Arizona	

May 1, 1975
(Spring semester
ends)

Robert Altschul

Dept. of Geography,
Regional Development,
and Urban Planning

"The Design of an Agri-
cultural/Social/Economic
System for the Medium-
Potential Lands of Kenya"

Kenneth Barnes

Dept. of Soils, Water
and Engineering

Theodore Downing

Dept. of Anthropology

Helen Ingram

Dept. of Political
Science

Peter Jacoby

School of Renewable
Natural Resources

William Martin

Dept. of Agricultural
Economics, The University
of Arizona

Special Seminar

57
May 7, 1975

Milo Cox

Office of Agriculture,
U.S. Agency for
International Develop-
ment

"A Simplified Approach
to Agricultural Systems"

Special Summer Seminar

July 9, 1975

Warren Forsythe

Tropical Agricultural
Research and Training
Center, Inter-American
Institute of Agricul-
tural Sciences (Costa
Rica)

"The Semi-Arid Areas of
Central America"

<u>Date</u>	<u>Speaker</u>	<u>Affiliation</u>	<u>Title</u>
Sept. 4, 1975 (Fall Semester begins)	Herbert Carter Jack Johnson Robert Scale	Interdisciplinary Programs Office of Arid Lands Studies Dept. of Nuclear Engineering The University of Arizona	"Progress and Prospects of the Program: A Review and Discussion."
<u>Series on:</u>			
<u>Multi-Disciplinary Activities:</u>			
<u>Description and Critique</u>			
Sept. 11, 1975	Robert Baker	Dept. of Systems and Industrial Engineering, The University of Arizona	"Multi-Disciplinary Teams: Their Trials and Tribulation
Sept. 18, 1975	Carl Tomizuka	Dept. of Physics, The University of Arizona	"Development of an Inter- disciplinary Course in Philo- sophy, History, and Physics."
Sept. 25, 1975	Allan Kneese	Dept. of Economics The University of New Mexico	"Multidisciplinary Initiative: In Natural Resources Resea.
Oct. 2, 1975	Fred Matter James deCook Kenneth Clark Kenneth Foster Lay Gibson Charles Glass Edward Williams	College of Architecture Water Resources Research Center College of Architecture Office of Arid Lands Studies Dept. of Geography, Regional Development, and Urban Planning Dept. of Mining and Geological Engineering Dept. of Political Science The University of Arizona	"Illustrations and Observati- on from an University of Arizo- na Multidisciplinary Team Field Study."

Oct. 9, 1975	Assibi Abudu	National Economic Planning Council of Ghana	"Economic Planning and Development in Ghana." (Not part of series)
Oct. 18, 1975	Gullermo Salas	Dept. of Mines and Geology, University of Sonora (Mexico)	"Mining in the State of Sonora: The Semi-Arid Environment." (Not part of series)
Oct. 23, 1975	Andrew Nichols	Dept. of Family and Community Medicine, The University of Arizona Medical Center	"Developing a Team Approach to Instruction of Health Science Students in a Medically Under-served Area."
Oct. 28, 1975	Frederick Anderson	Environmental Law Institute	"The Blind Men and the Elephant or Feeling our Way Toward Fabled Accomplishments in Interdisciplinary Research."
Nov. 6, 1975	Jack Johnson Thomas Weaver	Office of Arid Lands Studies Dept. of Anthropology The University of Arizona	"Mutual Understanding, in Interdisciplinary Initiatives: Frustration and/or Fulfillment."

Series on :

Desertification

Nov. 13, 1975	Patricia Paylore	Office of Arid Lands Studies The University of Arizona	"Desertification: What, Where, Why, and Who."
Nov. 20, 1975 (Fall Semester Ends)	Teran Smiley	Dept. of Geosciences The University of Arizona	"Desertification: The Consequence of Fooling Mother Nature."
Jan. 22, 1976 (Spring Semester Begins)	Ian Douglas	Dept. of Geography University of New England (Australia)	"Desertification Research in Australia."
Jan. 29, 1976	Julian Hayden	Arizona State Museum The University of Arizona	"Changing Climate in the Sierra Pinacate of Sonora, Mexico."

Feb. 3, 1976	Brian Spooner	Dept. of Anthropology University of Pennsylvania	"Desertification in Iran: A Case Study of Federal Attitudes."
Feb. 12, 1976	Bernard Fontana	Arizona State Museum The University of Arizona	"Desertification of Papagueria: Cattle and the Papago."
Feb. 19, 1976	Gerald Matlock	Dept. of Soils, Water, and Engineering The University of Arizona	"Segments of a Vicious Circle: Land Degradation and Water Resources."
Feb. 26, 1976	Harold Dregne	International Center for Arid and Semi-Arid Lands Studies Texas Tech University	"Desertification: A Worldwide Phenomenon."
March 4, 1976	Sherwood Idso	Water Conservation Laboratory U.S. Department of Agriculture	"Atmospheric Dust and Surface Albedo: The Effects on Desert- ification."
March 11, 1976	William McGinnies Raymond Turner	Office of Arid Lands Studies The University of Arizona U.S. Geological Survey	"The Ecology of Desertification"
2 April 1, 1976	David Simonett	Department of Geography University of California, Santa Barbara	"Roles for Space Sensing in Studying Desertification."
April 8, 1976	William Bell	Dept. of Geosciences The University of Arizona	"Trends in Desertification: Inter-Relations Between Vegetation, Erosion, and Stream Flow."
April 22, 1976	Harold Heady	College of Natural Resources University of California, Berkeley	"Desert Repaired in Southeast Oregon: A Case Study in Range Management."
April 29, 1976 (Spring semester ends)	Patricia Paylore	Office of Arid Lands Studies The University of Arizona	"Desertification Series Recap: What Have We Learned? Where Do We Go From Here?"

Series on:
The Application of Technology in Developing Countries

<u>Date</u>	<u>Speaker</u>	<u>Affiliation</u>	<u>Title</u>
Sept. 2, 1976 (Fall semester begins)	Robert Bulfin	Dept. of Systems and Industrial Engineering, The University of Arizona	"The Role of Technology Developing Countries: An Overview"
Sept. 9, 1976	Kenneth Barnes	Dept. of Soils, Water and Engineering, The University of Arizona	"Appropriate Technology in Food Production"
Sept. 16, 1976	Ross Hammond	Engineering Experiment Station, Georgia Insti- tute of Technology	"Industry-Related Approp- riate Technology"
Sept. 23, 1976	Norman Hillberry	Dept. of Nuclear Engineering, The University of Arizona	"The Atoms for Peace Pro- gram as an Experiment in Technological Assistance"
Sept. 30, 1976	Hugh Miller	Office of Foreign Secretary, National Academy of Engineering	"Some Criteria for Choice of Technology for Develop- ing Countries"
Oct. 7, 1976	Wayne Wymore	Dept. of Systems and Industrial Engineering, The University of Arizona	"On the Introduction of Modern Agricultural Technology into a Develop- ing Country"

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Oct. 14, 1976	Hans Guggenheim	The Wunderman Foundation	"Dual Technology: The Puzzle of Progress"
Oct. 21, 1976	Simon Ince	Depts. of Hydrology and Water-Resources, and Civil Engineering and Engineering Mechanics, The University of Arizona	"The Appropriateness of Appropriate Technology, or Can the Carabao Happily Coexist with the Gasoline Engine"
Oct. 28, 1976	Henry Arnold	Office of Science and Technology, Bureau for Technical Assistance, U.S. Agency for International Development	"Some Emerging Modes of Technology Exchange in the U.S. Foreign Assistance Program"
Nov. 4, 1976	Wayne Collins Carl Hodges	Environmental Research Laboratory, The University of Arizona	"Controlled Environment Agriculture, a High Level Technology -- Of Any Value to Developing Countries?"
Nov. 18, 1976	Len Berry	Graduate School of Geography, Clark University	"Remote Sensing and Developing Countries: Potential and Problems in the Transfer of a Technology"
Dec. 2, 1976 (Fall semester ends)	Robert Bulfin	Dept. of Systems and Industrial Engineering, The University of Arizona	"Technology in Developing Countries: The Future"

Series on:
The Application of Technology in Developing Countries

<u>Date</u>	<u>Speaker</u>	<u>Affiliation</u>	<u>Title</u>
Sept. 2, 1976 (Fall semester begins)	Robert Bulfin	Dept. of Systems and Industrial Engineering, The University of Arizona	"The Role of Technology Developing Countries: An Overview"
Sept. 9, 1976	Kenneth Barnes	Dept. of Soils, Water and Engineering, The University of Arizona	"Appropriate Technology in Food Production"
Sept. 16, 1976	Ross Hammond	Engineering Experiment Station, Georgia Institute of Technology	"Industry-Related Approp Technology"
Sept. 23, 1976	Norman Hillberry	Dept. of Nuclear Engineering, The University of Arizona	"The Atoms for Peace Pro as an Experiment in Technological Assistance"
Sept. 30, 1976	Hugh Miller	Office of Foreign Secretary, National Academy of Engineering	"Some Criteria for Choic of Technology for Develc Countries"
Oct. 7, 1976	Wayne Wymore	Dept. of Systems and Industrial Engineering, The University of Arizona	"On the Introduction of Modern Agricultural Technology into a Develc Country"

March 10, 1977	James Horsfall	Connecticut Agricultural Experiment Station	"The Green Revolution: History, Utilization, and Consequences"
March 24, 1977	Erwin Fuller	Office of International Activities, Environmental Protection Agency	"Environmental Aspects of the Development Process: Is the Choice Pollution or Poverty?"
March 31, 1977	Luis Enrique Wah Ruiz	Camara Nacional de la Industria de Transformación	"Development and Environmental Degradation: A Developing Country Perspective"
April 7, 1977	William Ittelson	Dept. of Psychology, The University of Arizona	"The Psychology of Technological Innovation"
April 14, 1977	Clark Bloom	Dept. of Public Administration, The University of Arizona	"The Impacts of Government Structure and Bureaucracy on Development"
April 21, 1977	Roy Rappaport	Dept. of Anthropology, The University of Michigan	"Adaptive and Maladaptive Development"
April 28, 1977 (Spring semester ends)	Roger Caldwell	Council for Environmental Studies, The University of Arizona	"An Overview of Environmental Factors in Development"

Series on:

Nutrition in Economic and Social Development

Sept. 1, 1977 (Fall semester begins)	Paul Pearson	Departments of Nutri- tion and Food Science, Family and Community Medicine, The University of Arizona	"World Nutrition: An Over- view"
Sept. 8, 1977	Derrick Jelliffe	School of Public Health, University of California, Los Angeles	"Infant Nutrition in Developing Countries"
Sept. 15	Otto Sieber	Department of Pediatrics, The University of Arizona	"Interrelationship of Nutrition, Infection, and Parasites"
Sept. 22, 1977	Miriam Muñoz de Chavez	National Food and Nutrition Program (Mexico)	"An Overview of Nutrition in Economic and Social Development."
Sept. 29, 1977	Joaquin Cravioto	National Institute of Child Health Sciences (Mexico)	"The Long and Short Term Effects of Malnutrition on Learning and Behavior"
Oct. 6, 1977	Stanley Gershoff	Center for Nutri- tion, Tufts University	"Extending Food Resources Through Mass Supplementation and Enrichment"
Oct. 13, 1977	Georg Borgstrom	Department of Nutrition and Food Science, Michigan State University	"The Food-Population Dilemma"
Oct. 20, 1977	Doris Calloway	Department of Nutri- tional Sciences, University of California, Berkeley	"World Calories/Protein Need/ Priorities"

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Oct. 27, 1977	Morrisa White	Bureau of Nutrition Services, Arizona Department of Health Services	"Nutritional Status of Arizona Populations"
Nov. 3, 1977	Max Milner	Department of Nutrition and Food Science, Massachusetts Institute of Technology	"Outlook for New Protein Resources"
Nov. 10, 1977	Gail Harrison	Department of Family and Community Medicine, The University of Arizona	"Strategies for Solving World Food Problems"
Nov. 17, 1977	Morley Kare	Monell Chemical Senses Center, University of Pennsylvania	"The Function of Taste in Food"
Dec. 1, 1977 (Fall semester ends)	William Stini	Department of Anthropology, The University of Arizona	"Human Adaptability to Nutritional Stress"

Series on:

Environmental Factors in Development

Jan. 20, 1977 (Spring semester begins)	Donald Wells	Dept. of Economics, The University of Arizona	"Economic Development of Oil Producing Countries The Lessons of Recent World Prominence"
Jan. 27, 1977	Eric Ross	Dept. of Sociology and Anthropology, Mount Holyoke College	"The State of Nature and the Nature of the State An Anthropological Perspective on the Ecology of Development"
Feb. 3, 1977	Frank Lambrecht	Dept. of Family and Community Medicine, The University of Arizona	"The Health Impacts of Development"
Feb. 10, 1977	Jean Circiello	Office of External Relations (Region Nine), Environmental Protec- tion Agency	"National and Internati Environmental Agencies: Activities and Informat Services"
Feb. 17, 1977	Melvin Marcus	Dept. of Geography, Arizona State University	"Geographic, Climatic, and Resource Factors in Development"
March 3, 1977	Robert Altschul	Dept. of Geography, Regional Development, and Urban Planning, The University of Arizona	"Population and Transpo tion Factors in Africa Development"

ANNEX B

Listing of 211(d)-Related Papers Presented at Professional ..

Meetings by University of Arizona Faculty

1974 -- 1977

Listing of

211(d)-Related Papers Presented

At Professional Meetings By

University of Arizona Faculty 1974-1978

Speaker	Title	Conference (Location/Date)
Robert Altschul	"Problems of Natural Resources Development in West Africa." (co-author: J.D. Johnson)	Annual Meeting of the Western Association of Africanists, Lincoln, Nebraska, March 1977
	"Agricultural Development in Kenya's Marginal Lands: Changing Perspectives."	Annual Meeting of the African Studies Association, San Francisco, California, November 1975.
Robert Bulfin	"Opportunities for, and Examples of, Appropriate Technology in Arid Lands Agriculture." (co-author: W.G. Matlock)	Annual Meeting of the African Studies Association, Boston, Massachusetts, November 1976
	"Intermediate Technologies for Arid Countries." (co-author: W.G. Matlock)	Annual Meeting of the American Association for the Advancement of Science, Denver, Colorado, February 1977
	"Some Opportunities for and Examples of the Use of OR/MS in Developing Countries."	National ORSA/TIMS Meeting, Atlanta, Georgia, November 1977.
E. Lendell Cockrum	"Ecological View of the Sahel-Sudan Zone of West Africa."	Annual Conference of the Consortium of Arid Lands Institutions (CALI), Lubbock, Texas, 1974
	"The Sahel-Sudan drought."	Western New Mexico University Lecture Series, Silver City, New Mexico, October 1974.
	"Management for Arid and Semi-Arid Zones of Northern Africa."	UNESCO/MAB Regional Meeting, Sfax, Tunisia, April 1975.
	"Overgrazing as an Evolutionary Force."	Western New Mexico University Lecture Series, Silver City, New Mexico. March 1976.

E. Lendell Cockrum (cont.)	"Colonial and Pre-Colonial Influences on Natural Resources in West Africa."	Annual Meeting of the African Studies Association, Boston, Massachusetts, November 1976.
	"Agricultural Production in the Sahel." (co-author: W.G. Matlock)	Annual Meeting of the Western Association of Africanists, Lincoln, Nebraska, March 1977.
	"Ecology and Environmental Concerns in Arid Lands."	Conference on Alternative Strategies for Desert Development and Management, Sacramento, California, June 1977.
	"The Case for Domestic Herbiyores."	Annual Meeting of the African Studies Association, Houston, Texas, November 1977.
John Crow	"Planning for Agricultural Development: A Case Study of Zinder, Niger."	Annual Meeting of the Western Association of Africanists, Lincoln, Nebraska, March 1977.
Myra Dinnerstein	"Impact of Women's History on Women's Studies."	Annual Meeting of the American Historical Association, Dallas, Texas, December 1977.
Theodore E. Downing	"Desertification and Man's Needs: A Cross Cultural Survey of Man's Role in the Process."	Annual Meeting of the American Association for the Advancement of Science, Denver, Colorado, February 1976.
Jack D. Johnson	"Desertification in the United States."	Regional Preparatory Meeting for the Americas, U.N. Conference on Desertification, Santiago, Chile, February 1977.
	"Plants as Potential Economic Resources in Arid Lands."	Conference on Alternative Strategies for Desert Development and Management, Sacramento, California, June 1977.
	"Concepts of Systems Analysis in Relation to Desertification: A Brief Review."	Meeting of the American Association for the Advancement of Science, Nairobi, Kenya, May 1977.
	"Desertification: A Process Occurring Without Climatic Change."	Annual Conference of the American Water Resources Association, Tucson, Arizona, October 1977.

- W. Gerald Matlock "Agricultural Production Systems in the Sahel." (co-author: E.L. Cockrum) Annual Meeting of the American Geophysical Union, San Francisco, California, December 1974.
- "The Northeast Ghana Savannah Project -- A Case Study in Project Design." (co-author: J.D. Johnson) Annual Meeting of the American Society for Engineering Education, Ft. Collins, Colorado, June 1975.
- "Gaps, Issues and Barriers in Natural Resources Development with a Focus on Water, Renewable and Non-Renewable Resources." (co-author: H.M. Ingram) AID/OST Strategy Conference, Tucson, Arizona, March 1976.
- "Opportunities for, and Examples of Arid Lands Agriculture." (co-author: R.L. Bulfin) Annual Meeting of the African Studies Association, Boston, Massachusetts, November 1976.
- "Intermediate Technologies for Arid Countries." (co-author: R.L. Bulfin) Annual Meeting of the American Association for the Advancement of Science, Denver, Colorado, February 1977.
- "Agricultural Production in the Sahel." (co-author: E.L. Cockrum) Annual Meeting of the Western Association of Africanists, Lincoln, Nebraska, March 1977.
- "Agricultural Development in Arid Lands: Potential and Constraints." International Conference on Alternative Strategies for Desert Development and Management, Sacramento, California, June 1977.
- "Importance of Arid Lands in the Global Economy." International Conference on Alternative Strategies for Desert Development and Management, Sacramento, California, June 1977.
- "North Africa, Breadbasket of the Roman Empire -- What Went Wrong?" Annual Meeting of the African Studies Association, Houston, Texas, November 1977.
- Wayne Wymore "A Management System for the Development of Natural Resources: A Peruvian Progress Report." Third World Conference, Omaha, Nebraska, October 1977.

ANNEX C

Special Program Areas Developed under the 211(d) Grant
at the University of Arizona

Each of the following program areas were those selected by the University of Arizona for interdisciplinary studies, projects or other related activities during the first four years of the 211(d) grant.

1. Arid Lands Information System
2. Handbook for Agricultural and Natural Resources Development of Arid and Semi-Arid Lands
3. Seminar Series
4. French Language Training
5. Assistance in Developing Training and Education Capability in Mineral Economics at the University of Arizona
6. West Africa Conference
7. Scientific and Technical Information Workshop in Ghana
8. Application and Evaluation of Remote Sensing in Tamne River Basin, Ghana
9. Exploration for and Development of Phosphate Rock for Indigenous Fertilizer
10. Design of a Natural Resource Management System for a Region in Peru
11. An Assessment of Regional Natural Resource Development in Long-Term Planning for Niger
12. Intermediate Technology for Natural Resources Development
13. Nutritional Ecology and Natural Resource Developemnt in West Africa
14. Women and Natural Resources Management in Arid and Semi-Arid Lands
15. Indigenous Housing
16. Technology for Natural Resources Development
17. Evaluating and Projecting the Impact of Large-Scale Copper Mining Operations in Southern Arizona and Northern Mexico

18. Environmental Policy
19. Program for Establishing a Center of Competence Relating to
Health and Natural Resources Development
20. Impact of Ground-Water Development in Arid Developing Countries
21. Desertification and Ethnicity: A Cross-Cultural Survey of
Man's Role in Land Degradation

ANNEX D

LISTING OF UNIVERSITY OF ARIZONA INSTITUTIONAL LINKAGES

Major linkages are those involving formal agreements with institutions in specific countries for joint research, training programs, and faculty exchange.

Minor linkages are those involving informal exchanges of information and occasional visits.

Arizona has established seven "major" linkages with the;

Council for Scientific & Industrial Research (CSIR), Ghana,
University of Science & Technology, Kumasi, Ghana,
National Office for the Evaluation of Natural Resources
(ONERN), Peru,
National Agrarian University of LaMolina, Peru,
Ministry of Planning, Niger,
Niger Center for Research in the Social Sciences, and the
Center for Research on International Development.

"Minor" linkages have been established with the;

Rural Engineering Section (Ministry of Rural Development) Niger,
National School of Administration, Niger,
National Union for Credit & Cooperation, Niger
Ministry of Agriculture of Sudan,
SOBA Agricultural Research Station, Sudan,
State Organization of Soils & Land Reclamation, Iraq,
National Agricultural School, Morocco,
Ministry of Tourism & Environment, Upper Volta
Department of Civil Engineering, University of Kuwait,
Natural Resources Research Institute, Chile,
University of Engineering & Technology, Pakistan,
National Institute for Agricultural Research, Tunisia,

National Institute of Agricultural Technology, Argentina,
National Patagonia Center, Argentina
Central Soil & Water Conservation Research & Training Center, India
Corporation for Production Development, Chile
College of Agriculture, Kabul University, Afghanistan,
National Agronomy Institute, Algeria,
Remote Sensing and Natural Resources Center, University of Chile,
Departments of Botany & Microbiology, University of Alexandria, Egypt
Central American Research Institute for Industry, Guatemala,
Korea Advanced Institute of Science,
Institute of Productivity & Management Planning, Mali,
Department of Groundwater Hydrology, Office of Hydrological
Resources, Mexico,
Niger River Commission,
National Engineering Services of Pakistan,
Voltaic Center for Scientific Research, and the Interstate School
for Rural Equipment Engineers, Upper Volta,
Turrialba, Costa Rica.

Informal ties have been established with;

U.N. Environment Programme (UNEP),
U.N. Food & Agricultural Organization (FAO),
World Bank (IBRD),
InterAmerican Development Bank (IDB),

Organization of American States (OAS),
U.N. Institute for Training & Research (UNITAR),
Tropical Research Center, Inter-American Institute of
Agricultural Sciences, OAS.

"Minor" linkages with non-LDC institutions have been established with;

Office of Overseas Scientific & Technical Research (ORSTOM), France,
Department of Geography, University of Sydney, Australia,
Department of Geography, University of Wollongong, Australia,
David Livingstone Institute, University of Strathclyde, U.K.
Department of Geography, University of New England, Australia.

Domestic linkages have been established with such institutions as;

Engineering Experiment Station, Georgia Institute of Technology,
Dry Lands Research Center, University of California, Riverside,
International Center for Arid and Semi-Arid Land Studies, Texas
Tech University, Lubbock.

ANNEX E

Letter of March 10, 1978 to President Schaefer of
University of Arizona from Niger Mission Director

Parham

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

March 10, 1978

Dr. John B. Schaefer
President
University of Arizona
Tucson, Arizona

Dear Dr. Schaefer:

I should like to thank you and your staff for the reception given me and my colleagues during our recent visit to the university. The evaluation of the University of Arizona 211(d) grant was undertaken in a spirit of cooperation which reflected your concern for finding solutions to difficult development problems and seeking methods to combine the resources of A.I.D. and the talents of the university in these solutions.

My colleagues and I were very impressed with the initiative shown by the university in the implementation of its work under the grant. The application of efforts to real problems is one of the few times I have seen grants of this nature used in this manner. You and your staff are to be complimented for these efforts.

Unfortunately, in the process of executing the Niger program, the university project staff made obligations to the Government of Niger which go well beyond available funding or the possibility of their being met. During the evaluation it became apparent that it will be necessary that appropriate action be taken to avoid embarrassment to the University of Arizona and the U.S. government. This matter was discussed in detail with Drs. Matlock and Johnson. Both agreed that in order to reach a reasonable solution it will be necessary to develop a sound, realistic work program for the period May 1978 - January 1979, and to find funding for this work program. I have urged that Drs. Matlock and Crow come to Niger during the first part of April to develop a work program in cooperation with the Niger Ministry of Plan. Once worked out and agreed to, A.I.D. will attempt to secure funding. This will allow the university to meet its obligations and Niger to receive the assistance anticipated under the terms of the initial and subsequent agreement between the university and the Ministry of Plan.

We expect that the university will share in this funding at least to the extent of that part of salaries of tenured professors previously charged to the project, e.g., Matlock, Johnson and Crow. Dr. Matlock indicated he thought such a contribution would be possible and that he considered it equitable under the circumstances.

I have cabled my office in Niamey and asked that arrangements be made with the Ministry of Plan for a visit by Drs. Matlock and Crow. I am confident that we, including Niger, will all benefit from this approach.

Sincerely,

Jay P. Johnson
Regional Development Officer
Niamey, Niger

CC:
Walter Parham, TA/OST
G. Matlock, Univ. of Arizona