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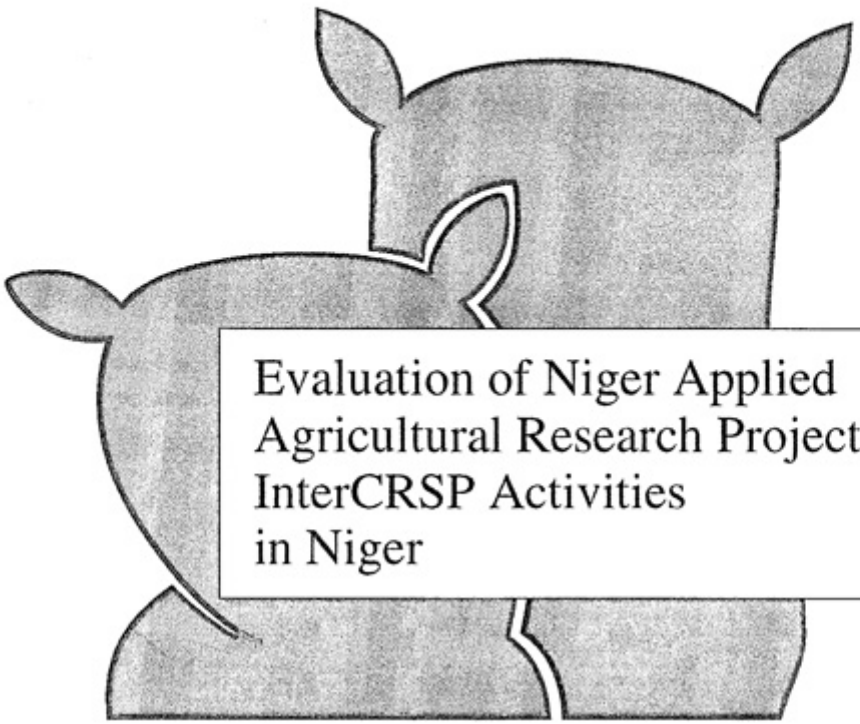

Evaluation of Niger Applied Agricultural Research Project and InterCRSP Activities in Niger

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EVALUATION OF NIGER APPLIED AGRICULTURAL RESEARCH PROJECT AND INTERCRSP ACTIVITIES IN NIGER

Final Report
26 August - 27 September 1996

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LIST OF ACRONYMS

CRSP	Collaborative Research Support Program
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
INRAN	Institut National de Recherches Agronomiques du Niger/National Agricultural Research Institute of Niger
InterCRSP	Collaborative effort of the INTSORMIL, TROPSOILS and Peanut CRSPs in Niger funded by USAID/Niger in 1995/1996
INTSORMIL	International Sorghum and Millet Collaborative Research Project
NAAR	Niger Applied Agricultural Research
NGO	nongovernment organization
ONAHA	Office National de Amenagement Hydro-Agricoles
PACD	Project Activity Completion Date
PNRA	Projet National de Recherche Agricole
PRSAA	Programme de Renforcement des Services d'Appui à l'Agriculture
RELU	Research/Extension Liaison Unit
TR&D	Tropical Research and Development, Inc.
TROPSOILS	Tropical Soils Collaborative Research Support Program
UNDP	United Nations Development Program
USAID/Niger	United States Agency for International Development Mission in Niger

EXECUTIVE SUMMARY

The Niger Applied Agricultural Research (NAAR) Project was authorized in 1987 with a goal of increasing agricultural production and diversifying sources of rural income. The purpose was to help the Institut National de Recherches Agronomiques du Niger/National Agricultural Research Institute of Niger (INRAN) institutionalize a system of applied agronomic research characterized by strong functional linkages between agricultural research and extension. The Project Activity Completion Date, originally 1992, was extended after a 1990 mid-term evaluation to July 1993, with major focus on human resource development, and in mid-1993 extended again to May 1997. Three centrally-funded Collaborative Research Support Programs (CRSPs) have been active in Niger, and in 1995, a fourth collaborative research program -- the Collaborative Effort of the International Sorghum and Millet Collaborative Research Project (INTSORMIL), Tropical Soils Collaborative Research Support Program (TROPSOILS), and Peanut CRSPs in Niger funded by USAID/Niger in 1995/1996 (InterCRSP) -- was initiated in Niger using grant funding from USAID/Niger and throughout the West Africa region with funding provided from USAID in Washington, DC.

The objective of the current evaluation is to update the results of the NAAR Project training component, detail other project accomplishments since the June 1990 midterm evaluation, detail CRSP/InterCRSP activities and accomplishments since the worldwide CRSP evaluation in 1994, and suggest possibilities for continued USAID support to research activities in Niger after the closure of the Niamey mission. The emphasis is on lessons learned.

NAAR Project research activities were constrained by decertification of INRAN by USAID, lack of support by INRAN, and the earlier than planned departure of the project technical assistance team. Project personnel contributed to INRAN's reorganization and elaboration of INRAN's mid- and long-term strategic plans. Project activities were essential for creating an irrigation section and a Research-Extension Liaison Unit within INRAN and developing two successful sorghum varieties, one sorghum hybrid, and improved millet/cowpea associations and rotations.

The training component attained most contributions toward project objectives. At the midterm evaluation, 12 long-term NAAR Project trainees had returned to the United States, and 10 were still in training. At the current evaluation, 37 long-term trainees had received USAID support, most fully funded by the NAAR Project; 10 of these are still in training, most at African universities. Only two long-term trainees failed to obtain their degrees, and both subsequently entered other degree programs. Three of six Ph.D. trainees have left INRAN after returning to Niger. Between 1990 and 1992, a total of 296 short-term training programs financed through the NAAR Project is cited in project documents; 32 individuals are cited by the USAID training office as having received short-term training since May 1992, and INRAN has done two in-country trainings and one seminar with NAAR Project funding.

InterCRSP/Niger activities planned in early 1995 have been a collaboration between INRAN, the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) Sahelian Center, and the INTSORMIL, TROPSOILS and Peanut CRSPs. USAID Niger was to provide financial support for the initial InterCRSP activities for 2 years (i.e., through FY 1996). These have been concentrated in two watershed sites, Hamdallaye, where TROPSOILS activities began in 1987, and Tanda, where until now most work has been done on characterization, but where some on-farm variety, fertilization, tillage, and rotation trials have begun. Other InterCRSP activities on sorghum hybrid seed production at three INRAN stations and a study of traditional seed selection methods, have been reported. A regional workshop on natural resource management and InterCRSP in West Africa was held in Niamey in September 1995.

In June 1990, the World Bank began a major agricultural research project, with many of the same NAAR Project goals, including long-term degree training. The World Bank project has been able to spend only a fraction of its planned budget, due to the same sort of institutional constraints that limited the NAAR Project. This project will continue, in conjunction with two other major World Bank projects, to support agricultural extension services and natural resource management in Niger.

RECOMMENDATIONS

- Based on CRSP research findings to date, InterCRSP activities, to be effective, should concentrate on integrated actions within the unifying theme of *increasing productivity through improved water management and increased soil fertility*;
- Within the context of USAID support for regional InterCRSP activities, maximum efforts should be made to involve INRAN researchers in the design, implementation, analysis, and publication of quality research in Niger and within the region;
- USAID should support InterCRSP efforts which further -- or, at least, do not undermine -- efforts by INRAN to (a) plan and implement research as a function of a rational long-term research strategy, and (b) strengthen institutional research/extension/farmer linkages;
- For World Bank/INRAN Projet National de Recherche Agricole (PNRA) and Programme de Renforcement des Services d'Appui à l'Agriculture (PRSAA), INRAN should create an external Scientific and Technical Council to provide effective and detailed peer reviews of INRAN research planning and operations;
- INRAN should implement its planned research staff evaluation early in 1997 to provide greater incentives to researchers based on the volume and quality of their work;
- INRAN should ensure that regular meetings of decentralized research planning/evaluation organs, such as the Regional Agronomic Research Committees, are held and that effective operational research/extension/farmer

linkages are developed using decentralized research/extension multidisciplinary teams to allocate resources to on-farm adaptive research and support technology dissemination with farmers;

- USAID should continue efforts to install effective regional nodes for internet communications to facilitate two-way E-mail and/or other communication between researchers and provide appropriate access for researchers to international agricultural library resources throughout the world;
- USAID should continue to support regional research networks for millet, sorghum, cowpeas, rice and natural resource management; and
- USAID, through the InterCRSP or other means, should provide independent research grants for researchers in the region to further specific work and facilitate production of jointly-authored scientific papers with colleagues at American universities and/or international research centers.

LESSONS LEARNED

- Lack of external funding has not been the binding constraint on developing increased research capacity at INRAN over the last decade, as demonstrated by the fact that INRAN has consistently failed to exploit or effectively manage the funds already provided to it by USAID, the World Bank, and other donor agencies.
- Effective political and consistent financial support by the Government of Niger is essential to strengthening and sustaining research capacity at INRAN and the Office National de Amenagement Hydro-Agricoles (ONAHA). Neither has been forthcoming over the last decade.
- Research agendas need to be responsive to specific farming system requirements and sharply focussed to produce useful technology transfer messages. Such prioritization and responsiveness are still not evident in current INRAN operations, even though total research efforts have recently been reduced from over 100 to about 25 programs.
- Continuity in senior leadership within INRAN is vital to the development and implementation of agricultural research programs. This has not been the case in the recent past since INRAN has had four different Directors General and six different Scientific Directors since mid-1990.
- Professional training is a *necessary but not sufficient* condition for developing and disseminating viable agricultural technologies for Nigerien farmers.
- Training researchers and support staff requires a supportive institutional environment that provides necessary intellectual and material support, recognizes research quality, and rewards individual and team initiatives in tangible ways.

- If a supportive institutional environment for quality research cannot be developed at INRAN, it is highly likely that more motivated researchers, particularly those with Ph.D. degrees, will increasingly seek more satisfying work in regional and international research and development networks.
- A separate Research/Extension Liaison Unit (RELU) within INRAN will be successful only if it actually conducts quality, farmer-driven, on-farm research over time in daily collaboration with extension services, and in a manner decentralized enough for researchers responsible for trials to keep close track through the season(s) of crop or animal comportment, data collection processes, and anomalies and problems encountered.
- The farming/herding environment of the Sahel, characterized by variable agroclimatic conditions and high levels of associated risk, requires that support of agronomic research institutions like INRAN be consistent and long-term, to encourage viable, coherent long-term research programs.

1.0 INTRODUCTION

1.1 Overview

1.1.1 The USAID/Niger Program for Technology Transfer

The United States Agency for International Development Mission in Niger (USAID/Niger) has supported agricultural technology development and transfer for more than 20 years. Since 1982, the primary vehicles for promoting such activities have been the Niger Cereals Research Project, the Niger Applied Agricultural Research (NAAR) Project, and three centrally funded Collaborative Research Support Programs (CRSPs) sponsoring research activities with millet, sorghum and peanuts and in soil and natural resource management. Starting in 1995, a fourth collaborative research program -- the Collaborative effort of the INTSORMIL, TROPSOILS and Peanut CRSPs in Niger funded by USAID/Niger in 1995/1996 (InterCRSP) -- was initiated in Niger using grant funding from USAID/Niger and throughout the West Africa region with funding provided from USAID in Washington, DC.

Under the guidance provided in the evaluation team's Statement of Work (Annex A), the team assessed the period from June 1990 [i.e., from the submission of the NAAR Project (683-0256) Mid-Term Evaluation (Bokde *et al.*, 1990)] to the present. The team assessed three CRSPs: (1) the International Sorghum and Millet Collaborative Research Project (INTSORMIL), (2) the Tropical Soils Collaborative Research Support Program (TROPSOILS), and (3) the Peanut CRSP. The team also considered the findings, conclusions, and recommendations of the comprehensive, worldwide evaluation of six CRSPs conducted in mid 1994 [Tropical Research and Development, Inc. (TR&D) 1994] since the evaluation included in-depth assessments of all CRSP activities supported by USAID/Niger.

The following subsections briefly summarize the goals, objectives and evolutions of the NAAR Project, the individual CRSP programs, and the InterCRSP.

1.1.2 NAAR Project Goal, Purpose, Anticipated Outputs, and Evolution

The NAAR Project was authorized in 1987 as Phase II of the Niger Cereals Research Project. The NAAR Project included elements from the Applied Irrigation Research and Coordination Project (683-0250), which USAID in Washington, DC had approved in 1986 with the recommendation that its planned activities be merged with the NAAR Project's planned activities.

The NAAR Project's goal was to increase agricultural production and diversify rural income sources to help the Institut National de Recherches Agronomiques du Niger/National Agricultural Research Institute of Niger (INRAN) institutionalize a system of applied agronomic research characterized by strong functional linkages between agricultural research and extension. The main

Project outputs were anticipated to be:

- Strengthening INRAN's institutional capacity to design, administer, manage and carry out applied agricultural research programs through USAID support for planning and management activities, human resources development, and strengthening of support services for research activities;
- Developing and executing specific priority multidisciplinary research programs on Niger's principal rainfed and irrigated food crops; and
- Establishing a functional research-extension coordinating unit.

Although project implementation did not start until 1988 and the complete technical assistance team was not in place until 1989, the mid-term project evaluation submitted in June 1990 gave a positive overall assessment of project performance. The mid-term evaluation team cited the following major deficiencies in project implementation:

- Significant lags in execution of the human resources development component resulting in a continued lack of highly qualified research expertise at INRAN; and
- Suboptimal management of NAAR Project financial resources by the Government of Niger leading to less than timely disbursements of operating funds and significant delays in the execution of planned research activities.

The midterm evaluation, acknowledging the implementation delays, recommended the following:

- The Project Activity Completion Date (PACD) for the NAAR Project be extended through July 1993;
- The major focus be on improving management of the human resources development component to enable M.S. and Ph.D. program participants at American universities to complete their studies and return to INRAN staff positions;
- An evaluation be held in the year proceeding the new PACD to determine whether a Phase II of the NAAR Project would be needed given the parallel development of a large World Bank-supported agricultural research project and, if so, what its components should be; and
- USAID/Niger conduct an immediate external audit of NAAR Project management.

Subsequent to the midterm evaluation, USAID approved the PACD change and accepted the recommendation to focus on human resource development. In addition, because of the findings of the external audit of NAAR Project management INRAN was decertified in June 1990 to receive and administer USAID funds on the grounds of financial irregularities and "serious reservations about the leadership of INRAN's financial and administrative service" (Purdue University *et al.*, 1992a).

Subsequent to this decertification, "USAID/Niger continued to make direct payments to INRAN in order to minimize the disruption of project activities during the period in which INRAN was to straighten out its accounting system. USAID continued this type of financial assistance until 1 March 1992, although considerable difficulties resulted from delays in payment of temporary labor" (Purdue University *et al.*, 1992a). By the end of 1992, the NAAR Project technical assistance team had returned to the United States and activities were limited to developing a comprehensive staff training plan for INRAN and implementing the Project's training component. All disbursements of USAID funding for the NAAR Project after March 1992 were administered either directly by USAID/Niger Controller or through American universities and regional institutions in West Africa acting as contractors for technical training.

Although most of the original NAAR Project participant trainees selected for long-term degree training had returned to Niger by the end of 1993, USAID/Niger and INRAN determined a need for additional institutional training that could occur with remaining Project resources. The PACD for the NAAR Project, therefore, was extended for a second time through May 1997 and a decision was made to expand training opportunities for candidates in irrigation management and related fields. Program activities in 1993 and 1994, after the end of direct technical assistance team activities, focussed on developing a training plan for INRAN and its affiliated agencies, chiefly the Office National de Amenagement Hydro-Agricoles (ONAHA). Under this plan, new participant trainees were selected and started their training programs in 1995, mostly at African universities and specialized training centers. Currently, seven of these participants are still in training.

Over the life of project (i.e., 10 June 1987 to 27 September 1996) the NAAR Project was authorized grant funding of $20,000,000. Obligations as of 10 September 1996 totaled $16,124,178, and actual expenditures amounted to $15,563,396. Of these costs, technical assistance, which ended in 1992, amounted to $10,521,544; local project costs $2,355,165; long- and short-term training costs $1,552,328; commodity and construction expenditures $801,714; and all other disbursements $332,645. Since 1992, NAAR Project funding has been disbursed almost exclusively in support of participant training activities.

1.1.3 CRSP Activities in Niger through 1994

As stated previously, three CRSPs were active in Niger during the decade prior to 1994. This collaboration between American universities and INRAN provided support for planning and implementing discrete crop research and natural resource management activities, including training INRAN personnel, funding participant trainees' thesis and dissertation fieldwork, and providing laboratory equipment and other resources for conducting field research.

Through the CRSPs, many INRAN researchers trained under the Niger Cereals Research, and NAAR Project personnel received additional financial and scientific support from American

universities to conduct field experiments and complete their M.S. thesis and Ph.D. dissertation research requirements. Through this parallel assistance mechanism, therefore, CRSP support complemented NAAR Project assistance and improved INRAN's research capacities.

The International Sorghum and Millet CRSP focussed its activities primarily on introducing sorghum varieties, including hybrid breeding lines; testing improved fertilization and tillage techniques for millet and sorghum in pure stands and intercropped with cowpeas; and associated on-farm economic work. The Peanut CRSP limited its work to assisting with introducing new peanut lines, and the TROPSOILS CRSP concentrated its field activities at Hamdallaye and on strengthening INRAN's Soils Laboratory in Niamey.

1.1.4 InterCRSP Activities in Niger since the 1994 CRSP Evaluation

As stated previously, three CRSPs had worked in Niger prior to 1995 on issues related to the sustainability of food production systems and natural resource management. The concept of CRSPs working more collaboratively on development and resource management issues within a regional context gained more credence as a result of direct comments from USAID Missions and national partners in CRSP initiatives, supported by the findings of the worldwide evaluation of six of the eight existing CRSPs in late 1994. USAID/Niger and INRAN were in the forefront as proponents of restructuring CRSP activities in West Africa, and the CRSP institutions quickly recognized the potential benefits to be derived from promoting and implementing the InterCRSP concept.

The InterCRSP initiative as it developed in 1995, therefore, refers to a collective agreement among the active CRSPs to plan and implement programs and activities jointly. This agreement is designed to provide access to the collective strengths and expertise available in the CRSP universities and institutions. The legal basis for implementing the InterCRSP initiative is the Memorandum of Understanding and the bylaws of the CRSP Council (Gebrekidan *et al.*, 1995).

Early in 1995 as tangible proof of its commitment to the InterCRSP, USAID/Niger provided funding for the INTSORMIL, TROPSOILs and Peanut CRSPs to initiate an InterCRSP activity in Niger. Simultaneous with initiation of the country-specific InterCRSP activities in Niger, the Africa Bureau of USAID in Washington and the CRSP Council started developing a broader InterCRSP initiative in which as many as six CRSPs would be partners. Natural resource management was identified as a cross-cutting theme for mobilizing the collaborative efforts of the partner CRSPs in West Africa. In Niger and the region, the InterCRSPs are seen as providing a mechanism to coordinate USAID support with CRSPs, national agricultural research systems, and international agricultural research centers, as well as with private voluntary and nongovernment organizations (NGOs).

Under the special grant funding from USAID/Niger, three activities were to be implemented:

- Fielding a team to Niger and other West African countries to make a strategic assessment of InterCRSP natural resource management issues in the region;
- Initiating a network of scientists and institutions for regional participation; and
- Hosting a workshop on advances in natural resource management technology for West Africa (Integrated Pest Management CRSP, 1995).

On 22 March 1995, the CRSP Council designated the Integrated Pest Management CRSP to be the lead CRSP in implementing a Natural Resource Management InterCRSP initiative in West Africa. Specific InterCRSP activities for Niger were formulated as a synthesis of deliberations in a workshop held in Niamey on 2-5 May 1995. According to the 1995 Work Plan, "the goal of the InterCRSP collaborative effort is to integrate the diverse strengths and experience of the primary entities working on agricultural research in Niger" (i.e., INRAN; ICRISAT; and the three pre-existing INTSORMIL, TROPSOILS, and Peanut CRSPs). InterCRSP planners postulate that "this collaboration will facilitate sustainable use of the natural resources in the fragile Sahelian ecosystem upon which the fate of the farmers depend." To accomplish the stated goal, the research partners seek to introduce farming technologies that will help the farmers meet the needs of the present without compromising the ability of future generations to meet their own needs. The information generated by the collaborative effort is also intended to be used by decision makers to provide insight to help implement policy reform or create market incentives for the farming community. Finally, "the efforts of the individual organizations will be combined in a complimentary way and thereby empower the farmers with the tools they need to reduce poverty and increase food security in the region" (INRAN, 1995c).

The watershed is seen in the InterCRSP Work Plan as "a natural management unit that makes sense both environmentally (e.g., energy and nutrient flows through the ecosystem) and economically (e.g., many of the investment costs are internalized in the watershed management unit because of the interconnectivity of benefits)." The watershed management approach will therefore be used to develop an integrated system of soil, water, nutrient, and plant management for food, fodder and fuelwood production and provide a planning unit for considering the various environmental and socioeconomic impacts associated with technological innovation. This collaborative effort, facilitated over the last 2 years by USAID/Niger, is the first time that multiple CRSPs have sought to combine their respective strengths in various aspects of agricultural research to develop an integrated project.

The stated objectives of the InterCRSP integrated watershed management approach are to:

- Create public awareness of natural resource management and conservation (i.e., the critical linkages between common grazing lands on the plateau and the crop lands in the valleys);

- Test and demonstrate low-cost technologies for rejuvenating the degraded laterite plateau through, for example, water harvesting, fuelwood, and forage production;
- Research and demonstrate on-farm soil management options to sustain millet and cowpea production;
- Develop a methodology for small agricultural watershed management in the Sahel;
- Generate information needed for formulating natural resource management policies; and
- Generate information needed to facilitate crop processing and marketing.

The InterCRSP initiative is seen as a phased approach with the following activities:

- Site characterization, including physical, biological, socioeconomic, land tenure and indigenous knowledge assessments of watershed conditions;
- Design and implementation of on-farm research and demonstration interventions, including integrated food, fodder, and fuelwood production systems;
- Design and implementation of post-harvest use and processing activities and village industries; and
- Technology diffusion through field days, site visits, and training courses to involve farmers from other areas, local communities, private voluntary and nongovernment organizations, policy makers, and researchers.

Two agricultural watersheds have been chosen as sites for InterCRSP activities based on the following considerations:

- Logistics, particularly distances between sites;
- The presence of a toposequence that defines the watershed at a resolution level that makes ecological and economic sense;
- Presentation of a contrast between a degraded site with low current productivity and a more productive site that is not already severely degraded;
- Applicability as a site for demonstration and diffusion activities; and
- Ability of all three CRSPs to do meaningful work on the site.

It was anticipated that activities during the 1995 and 1996 growing seasons would be conducted at two main sites: the Hamdallaye watershed near Niamey, where the TROPSOILS CRSP had been working in the past, and the Tanda watershed near Gaya in southern Niger. The total budget proposed for 1995 and 1996 activities was $291,940.

1.2 Objectives of Current Evaluation

The current evaluation, because it is taking place 4 years after the effective end of the technical assistance and research support component of the NAAR Project, must necessarily have limited

objectives. The imminent closing of USAID/Niger Mission meant that the sort of mission-centered recommendations generated by an end-of-project evaluation were not called for. Therefore, this evaluation, although late and constrained by the Mission closing, identifies lessons learned about support of agricultural research in the Sahel that may be of interest to USAID; INRAN; and present INRAN collaborators, such as ICRISAT, the World Bank, and CRSPs involved in regional InterCRSP activities.

The evaluation's first objective is to update the results of the training component of the NAAR Project, provide current information on the locations and activities of returned participant trainees, and present a snapshot of their current status within the INRAN staffing structure.

The evaluation's second objective is to detail:

- Any advances made toward achieving the NAAR Project goal, purpose, and outputs since the midterm evaluation report in June 1990 and which of those were maintained after the technical assistance team was withdrawn in June 1992; and
- Any CRSP/InterCRSP activities and accomplishments in Niger since the worldwide CRSP evaluation conducted in mid 1994.

The third objective is to suggest what possibilities still exist for effective USAID support to agricultural technology development and transfer given the findings and lessons learned about NAAR Project/CRSP activities to date and that the implementation of two major World Bank projects and the presence of the ICRISAT Sahelian Center at Sadore strongly influence Niger's current agricultural research/extension environment.

1.3 Methodology Used

From 26 August to 13 September 1996, the evaluation team used the following methodologies to derive its findings, formulate its conclusions, present its recommendations, and propose lessons to be learned from the USAID/INRAN experiences in strengthening agricultural research capacities in Niger:

- In-depth reviews of the available documentation on NAAR Project, CRSP, and InterCRSP activities, emphasizing events since June 1990;
- Group and individual interviews with research and management personnel from INRAN and its affiliated organizations, emphasizing discussions with those persons who received participant training;
- Interviews with USAID/Niger officials charged with daily management of NAAR Project, CRSP, and InterCRSP activities;

- Interviews with representatives of organizations that support agricultural research programs and activities in Niger, including ICRISAT, the World Bank, the United Nations Development Program (UNDP), and NGOs; and
- Onsite observation of INRAN research activities at INRAN headquarters and experiment stations and sites, including Kollo, Hamdallaye, Birin-Konni, and Maradi.

2.0 FINDINGS

2.1 The NAAR Project Training Program

2.1.1 Long-Term Degree Training

The NAAR Project Grant Agreement of June 1987 stipulated that advanced training was to be provided for up to 17 INRAN, 2 ONAHA and 2 Rural Engineering staff members. Long-term INRAN scholarships were to be used only for degree studies of current personnel and/or graduate students assigned to INRAN. Preference was to be given to senior researchers needing M.S. or Ph.D. degrees, irrigation-related studies (e.g., soil, water and crop management, engineering), and dryland agronomy. Of the 17 INRAN staff to be given advanced professional training, up to three persons were to have been sponsored for Ph.D. programs of three years each in the United States.

All courses of study were to be directed at strengthening INRAN's capacity to execute priority applied research programs as described in the NAAR Project Grant Agreement. Specialized nondegree training in the United States and Africa was also to be provided to staff members of INRAN, ONAHA and Rural Engineering.

The total training program was budgeted at $2,821,600 in the Grant Agreement, including a Government of Niger contribution of $462,500. Candidates for training funded by the NAAR Project were to be selected jointly by the agency concerned (i.e., INRAN, ONAHA, or Rural Engineering), the technical assistance contractor, and USAID/Niger. After participant trainee candidates were selected, the technical assistance contractor was to be in charge of identifying appropriate training opportunities, securing placements for participants, and handling all logistical arrangements before the trainee departed for his or her training program. The contractor was also to ensure that arrangements were made for participant accommodations in the United States and for payment of all support allowances. Finally, the contractor was to monitor trainee performance through the period of training and submit progress reports to USAID/Niger and INRAN at the end of each academic period.

As of the NAAR Project midterm evaluation, it was reported that 12 long-term participants had returned to Niger with their degrees and were filling positions at INRAN. In addition, 10 long-term participants were receiving training in the United States and six more had been selected to enter training for the 1990/1991 academic year.

The midterm evaluation team stated that "at the present time, the long-term participant training program is behind schedule because of the shortage of available staff members in INRAN and the slow administrative handling on the part of AID/Niger" (Bokde *et al.*, 1990). In consideration of this finding, the evaluation team recommended two actions:

- "Phase I of the NAAR project (No. 683-0256) be extended into 1993, using monies budgeted for but unspent to date. This will permit more trainees to return, start work, and allow for a better organizational structure of INRAN to be established."
- "USAID and INRAN should direct greater effort and flexibility to resolving and accelerating the process of the selection and approval of training candidates. This will allow the remaining long-term participant training positions to be filled and used before the end of the project. The recently formed INRAN Division of Training should place the greatest priority to the training of research technicians as well as other research support staff in the different categories" (Bokde *et al.*, 1990).

At the time of the technical assistance contractor's final administrative report, "advanced professional training was provided by NAAR Project for 16 INRAN and two Genie Rural and two ONAHA personnel.... Most advanced degree trainees were students at various U.S. universities. The long-term trainees were managed through the USAID/Niger Training Office, although the technical assistance team members played a major role in processing the students in Niger, and the Purdue Coordination Office was involved in their placement" (Purdue University *et al.*, 1992a).

Since the termination of the contracted technical assistance team in 1992 and the decision to limit future NAAR Project activities to providing participant training at institutions in Africa, a joint INRAN/USAID/Niger multiyear training plan has governed training grants. Under this plan, long-term training has concentrated mainly on providing opportunities for participants at the technician and support staff levels. Six of the seven participants still in training under NAAR Project are studying at African institutions, one is completing a Ph.D. program in the United States, and two participants started technical training at American universities and subsequently were granted assistantships for degree programs from other sources.

According to INRAN and USAID/Niger training program records, 37 participants were given USAID funding for long-term studies related to strengthening agricultural research capacity during the life of the NAAR Project. The NAAR Project fully funded most, but not all. Other funding for degree training came from the CRSPs; the Sahel Human Resources Development Project; and, for the earliest participants, the Niger Cereals Research Project. Annex D contains detailed information on each of the 27 participants who have finished their USAID-funded studies and the 10 participants who are still in training. Table 1 summarizes the results of the long-term participant training by field of study and degree level.

Table 1. Results of the NAAR Project Long-Term Participant Training Program: 1987-1996

Field of Study	Ph.D. Degree	M.S. Degree	Other Degree
Soil Sciences	3	1	2
Plant Sciences	0	1	0 1/
Agronomy	0	3 2/	2 2/
Plant Breeding	2	0	0
Agricultural and Other Engineering	0	0	5 1/, 3/
Food Technology	0	1	0
Agricultural Economics	0	4 4/	1
Irrigation	0	1	0
Seed Technology	0	2	0
Computer Sciences	0	0	2
Statistics	1	1	0
Animal Science and Veterinary Medicine	0	0	2
Sociology	0	0	2
Unknown	0	2	0
TOTAL	6	16	16

Note: 1. One candidate started but did not complete a degree program in plant physiology.
2. One candidate received B.S. and M.S. degrees with USAID/Niger funding.
3. Includes two degree programs in teledetection (i.e., use of satellite imagery and other systems).
4. Includes two M.S. and two Doctorate 3eme Cycle programs.

Over the course of the long-term training program, only two degree candidates failed to complete their intended degrees (one in civil engineering and one in plant physiology). Both of these candidates subsequently entered different degree programs, and one has completed a USAID-support degree in teledetection techniques.

Of the 27 participant trainees who have attained degrees during the life of the NAAR Project, 21 are still working in Niger with public agencies concerned with agricultural research (i.e., INRAN, ONAHA, or the Ministry of Agriculture). Three of the six Ph.D. recipients to date have resigned from INRAN. One is working for UNDP in Niamey as an advisor on natural resource management and sustainable agriculture; the second is working for ICRISAT at the Sahelian Center in Sadore as the regional coordinator of the Central African Millet Research Network (ROCAFREMI); and the third is working with the West Africa Rice Development Association in Bouake, Cote d'Ivoire. Two other participant trainees who received M.S. degrees funded by USAID/Niger have been granted funding through the World Bank-supported agricultural research project for Ph.D. programs and have returned to the United States for their training. Finally, one M.S. degree recipient in statistics returned to Niger and worked for 1 year before resigning and immigrating permanently to the United States.

As can be seen in Table 2, research personnel available to INRAN in all grades totaled 181 in September 1995. Senior Grade A1 researchers (i.e., holders of advanced academic degrees) totaled only 45. Among these 45 researchers, 21 (or approximately 47 percent) hold their positions because they participated in the advanced degree programs offered through USAID-supported projects.

2.1.2 Short-Term Training

Between 1990 and 1992, a total of 296 short-term training programs financed through the NAAR Project were cited in project documents. Of these, 264 were completed before June 1992 (i.e., before the end of the technical assistance team's participation in the NAAR Project). Of the 264 programs cited, 179 were conducted in Niger, 50 in other African countries, 30 in the United States, and six elsewhere in the world, primarily in India. Eighty-nine of these training programs were for INRAN researchers, with many researchers benefitting from multiple training opportunities. The rest of the programs were for INRAN technicians, accountants, and other

Table 2. Total Research Personnel Available to INRAN as of September 1995

INRAN Division	Grade A1	Grade A2	Grade A3	Grades B1/B2	Grades C/D	Total Personnel
DRA	21	11	2	22	12	75
DRE	5	13	--	6	14	28
DECOR	4	4	--	1	--	9
DRF	4	2	--	2	2	10
DRZ	7	2	--	2	2	13
DAAF	2	4	--	11	10	27
DEP	1	1	--	--	--	2
DF	--	1	--	--	--	1
DSI	--	1	1	3	4	9
CLRV	1	--	--	1	--	2
DIVAD	--	1	1	2	--	4
Total Personnel	45	38	4	50	44	181

Note:
1. Grade A1 includes researchers who are holders of Ph.D., *Doctorat, DEA, Ingénieur Agronome, Vétérinaires, DAA* and Master of Science degrees.
2. Grade A2 includes researchers who are holders of *Diplôme d'Ingénieur des Techniques*, Bachelor of Science or equivalent degrees.
3. Grade A3 includes research technicians who are holders of *Diplôme de Technicien Supérieur.*
4. Grades D, C and D includes technicians who are holders of a *Diplôme de Niveau Moyen.*

CLRV = Cellule de Liaison Recherche.
DAAF = Direction des Affaires Administrative et Financières/Division of Administration and Finance.
DECOR = Département de Recherches en Economie Rurale/Department of Agricultural Economics.
DEP = Division des Etudes et de la Programmes/Division of Studies and Programs.
DIVAD = Division Information, Valorisation et Documentation/Division for Information and Documentation.
DRA = Département de Recherches Agricoles/Department of Agronomic Research.
DRE = Département de Recherches Ecologiques/Department of Ecological Research.
DRF = Département de Recherches Forestières/Department of Forestry Research.
DSI = Département des Statistiques et de l'Informatique/Department of Statistics and Computer Operations.

Source: Salou, M. 1995. *Rapport d'Activites -- Période: Avril-Octobre 1995.* INRAN, Niamey, Niger, p. 2.

office staff, civil engineers and drivers; ONAHA staff; and 58 extension personnel. The NAAR Project Final Administrative Report (Purdue University *et al.*, 1992a) contains details of these programs.

The USAID/Niger draft report *Situation des Anciens Etudiants INRAN en Fin de Formation, 1989-1995* states that 32 individuals received short-term training since May 1992. Annex D lists these participants. All of these participants received their training in the United States or at training sites in African countries other than Niger. There is no similar record of participants receiving short-term training in Niger after the end of 1992. As stated in *Apercu Sur Les Sessions de Formation Courte Duree* (Salou, no date), NAAR Project-financed short-term training of INRAN personnel in Niger between September 1993 and September 1994 consisted of the following activity types:

- Training in calibrating, maintaining, and repairing scientific instrumentation at the INRAN Soils Laboratory;
- Training in analytical techniques at the INRAN Soils Laboratory; and
- A symposium on the use and transformation of sorghum and related cereals.

2.2 NAAR Project Activities Since the Midterm Review in June 1990

The time that has past since the end of NAAR Project-funded research activities has affected USAID/Niger's institutional memory about the project in several ways. One is that post-midterm evaluation NAAR Project semi-annual reports are available only in French, and it is uncertain if English versions are to be found in Niger. The final NAAR Project technical report (Purdue University *et al.*, 1992d) highlights the limitations to actually conducting project-funded research due to the decertification of INRAN; the early departure of the first project Chief of Party and the Research-Extension Specialist; the slowness or failure of INRAN to assign counterparts and other research staff to the NAAR Project, particularly in the irrigation section and the RELU; and the wind-down of the entire technical assistance component of the NAAR Project ahead of its anticipated PACD in July 1993.

Since the NAAR Project midterm evaluation in June 1990, activities aimed at improving INRAN's capacity to implement research centered on research management and planning in general and specifically on irrigation water management research programs and planning processes. The first group of activities involved participation of the NAAR Project Chief of Party in January/February 1991 meetings to develop INRAN's reorganization plan, the INRAN biennial meeting in May 1991 to explain the reorganization to researchers, and workshops at Tillabery in January/February 1992 on implementing the INRAN long and medium-term research plans.

NAAR Project technical assistance contributed to the formation of INRAN's irrigation section and carried out research in 1990 and 1991 in irrigation water use database collection at three ONAHA-managed sites and two private irrigated micro-systems sites. Work in 1990 and 1991 centered on:

- Water lifting studies among microsystems;
- Water use and system diagnostic studies, including water losses due to dams and evaporation; and
- A water scheduling program for irrigated perimeters.

One of the chief objectives of the NAAR Project, institutionalizing improved research-extension linkages by creating a RELU, seemed to be progressing well in 1989, but momentum was not maintained after the midterm evaluation. The RELU continues to exist, but does not conduct on-farm trials; rather, it acts as a clearinghouse and intermediary between station-based researchers who design trials and analyze results and extension agents who implement the trials in the field.

Semiannual NAAR Project reports of March 1991 and September 1991 cite the following research activities:

- Lysimeter studies on the relationship between drought and millet yields, using variety CIVT in 29 treatment combinations, plus control plots;
- Analysis of the soils at Tarna 2 research station;
- Analyses of irrigation water at 11 sites in the Maradi-Goulbi-Taraka and the Adar-Doutchi-Maggia valleys;
- Study of four soil phosphorus extraction methods to identify the one that best corresponds to millet and sorghum growth in Niger;
- Studies of irrigated soils, crop diversification, labor use, spatial variability and management of crop residues;
- Reorientation of INRAN's Departement d'Economie Rurale for 1991/1992 toward analysis and publishing of reports on previous studies and entering and analyzing all past Birin-Konni research station data;
- Publishing a preliminary analysis on farmer adoption of animal traction;
- Continuation of adoption studies on improved millet/cowpea intercropping (already studied from 1985 to 1989) and other new technologies;
- The International Sorghum and Millet CRSP on-farm trials in five regions on sorghum variety SRN 39, sorghum/millet and sorghum/peanut intercroppings; on-farm trials in the Birin-Konni region on nitrogen and phosphate fertilization of sorghum; and a demonstration trial of sorghum hybrids in Agadez;
- Second-year on-station trials on nitrogen fertilization of sorghum and third-year trials on the effects on soils of crop residues;
- Maintenance of three sorghum germplasm collections;

- Cowpea breeding work for resistance to bruchids and thrips in collaboration with an International Institute for Tropical Agriculture researcher posted to ICRISAT Sahelian Center at Sadore; and
- Economic analysis of previous on-farm cowpea insecticide trials showing viability of one treatment in the flowering stage.

In addition to the sketchy results, with incomplete analyses, presented for some of these activities in the NAAR Project Final Technical Report (Purdue University *et al.*, 1992c), many publications were produced as a result of project activities after the midterm evaluation. The NAAR Project Final Administrative Report (Purdue University *et al.*, 1992a) lists 96 publications issued in or after 1990. Most of these were internal project and INRAN publications, technical extension bulletins (*fiche techniques*) on file in the INRAN library. Forty-two were presentations and seminars, and 27 were reports by consultants. Of total publications listed, 24 were articles published by or submitted to peer-reviewed journals. The evaluation team identified four more peer-reviewed articles published after 1990. Of these 28 refereed journal articles, only 11 had Nigerien INRAN co-authors.

The NAAR project is credited within INRAN for some part of the development/testing of the following technologies, which are currently being extended to farmers:

- Sorghum variety SEPON-82, which is thought to be high-yielding and stable across environments, with good grain quality and acceptability to consumers;
- Sorghum variety SRN-39, which is considered resistant to *Striga*;
- Sorghum hybrid NAD-1, which is promising under irrigated cultivation;
- Improved millet/cowpea intercropping systems, using improved varieties and higher plant densities; and
- Improved millet/cowpea rotation systems, which permit higher millet yields and improved soil fertility without nitrogen fertilization, but require long-term changes in farmers' agronomic practices.

2.3 InterCRSP Activities Since 1994 CRSP Evaluation

The InterCRSP/Niger activities planned in early 1995 were seen as an active collaboration between INRAN; the ICRISAT Sahelian Center; and the INTSORMIL, TROPSOILS and Peanut CRSPs. USAID/Niger was to provide financial support for the initial InterCRSP activities for two years (i.e., through FY 1996).

2.3.1 The Hamdallaye Watershed Site

The Hamdallaye watershed site is located 35 kilometers northeast of Niamey. The site is composed of plateau, escarpment and valley areas comprising in total about 500 hectares. Agriculture in the area is dominated by millet/cowpea culture.

The TROPSOILS CRSP has used the site since 1987 when Dr. Mamadou Ouattara, the former Director General of INRAN, conducted initial soil/water and site characterization studies. Full site characterization at Hamdallaye was completed between 1989 and 1991 and documented in CRSP reports between 1991 and 1994 (Taylor-Powell *et al.*, 1991; Manu, 1991; Djibo and Ibro, 1993; Manu, *et al.*, 1994).

TROPSOILS CRSP activities onsite were divided between interventions directed at rejuvenating the laterite plateau and escarpment, rejuvenating degraded arable land by natural fallow, and trials to improve crop production on arable land. The purpose of the land rejuvenation program was "to demonstrate and monitor appropriate interventions that can reduce runoff and erosion from the plateau and to improve plant production on the plateau" (Manu *et al.*, 1994).

Principal interventions were using a rainfall simulator to determine infiltration rates of 1 square meter plots, constructing three Universal Soil Loss Equation plots to monitor runoff and erosion on the slope between the plateau and valley areas, constructing two types of catchments; and planting of selected plant species in the catchments. Species used included: *Prosopis juliflora, Zizyphus mauritiana, Acacia holosericea, Bahhinia rufescens* and *Andropogon guyanus*. The tree species were planted on Hamdallaye plateau and slope areas in August 1992 and were "intended for demonstration purposes, but several small studies were conducted to document vegetation growth" (Manu *et al.*, 1994).

Fallow land rejuvenation monitoring was carried out using two 30- by 30-meter exclosures each on two soil series over a 3-year period. After the protection period, the top 15 centimeters of soil in the exclosures were sampled and four 6- by 7-meter plots in each exclosure were established and planted to intercropped millet and cowpeas. Grain and biomass yields of millet were determined.

Trials directed at improving crop production on arable land in the Hamdallaye valley were also conducted. Farmer-managed and researcher-directed trials were implemented to test technologies previously developed on INRAN and ICRISAT research stations.

The farmer-managed trials were designed to determine the yields on fields where farmers were using extension advice but had no direct inputs from INRAN researchers. Farmers were furnished with inorganic fertilizers, manure, seeds and insecticides. Participant farmers took these inputs and were responsible for the daily management of crops from planting to harvest. Researcher-directed

trials were used to compare the interaction of technology and management associated with the farmer-managed trials. A set of researcher-directed plots was installed on each soil type. Agronomic treatments tested in the watershed included:

- A traditional millet/cowpea intercrop system;
- A high plant density millet/cowpea intercrop system, with application of phosphate fertilizer;
- A crop rotation with cowpeas planted in 1992, followed by millet in 1993;
- A high plant density millet/cowpea intercrop system, with manure fertilization; and
- A high plant density millet/cowpea intercrop system, with millet residues used as mulch.

Results of these onsite activities are well documented in TROPSOILS CRSP publications, particularly in TropSoils/TAMU Bulletin No. 94-01.

The specific InterCRSP activities planned in 1995 involved testing two improved and one local millet varieties, millet/cowpea rotations using local rock phosphate or conventional phosphatic fertilizer, and trials on efficient crop use of water and nutrients. The first activity was to be jointly conducted by INTSORMIL and INRAN researchers, with five participant farmers; the second by INTSORMIL, ICRISAT, and INRAN researchers, with 14 participant farmers; and the third by TROPSOILS and INRAN researchers, with two participant farmers. In addition, the InterCRSP was to maintain and continue the TROPSOILS CRSP monitoring activities on soil losses and regeneration of plant communities on the plateau and general soil/climate data collection.

The evaluation team observed continuing TROPSOILS CRSP activities on the Hamdallaye plateau and two types of researcher-directed field trials in the adjoining valley. One 2x2x3 trial involved treatments with millet/cowpea intercrops, rock phosphate and triple superphosphate fertilization, and manual and animal traction tillage techniques. A second was a rotation trial for millet and cowpea in pure stands. Research protocols for InterCRSP trials were reviewed. No statistical data or research trial analyses for 1995 InterCRSP activities at Hamdallaye were offered for evaluation team review.

2.3.2 The Tanda Watershed Site

The new Tanda watershed site is located in the extreme south of Niger approximately 300 kilometers from Niamey near Gaya. The zone is rated as one of the highest potential agricultural areas in the country. The watershed site comprises approximately 700 hectares, and the predominant farming system is a cereals/legume rotation with sorghum and peanuts. It is reported that ICRISAT researchers had been working in the area prior to the inception of InterCRSP activities in 1995.

Planned InterCRSP activities over the period included the following:

- Site characterization activities examining the physical, biological and socio-economic parameters relevant to sustainable agricultural production in the watershed;
- On-farm sorghum and millet varietal trials directed by INTSORMIL and INRAN researchers;
- Trials with peanut varieties and calcium applications directed by Peanut CRSP and INRAN researchers; and
- Trials involving rock phosphate applications on sorghum and millet, tillage and residue application techniques, and sorghum/peanut crop rotations directed by ICRISAT and INRAN researchers.

During the 1995 and 1996 growing seasons, INRAN and ICRISAT carried out on-farm research, including testing sorghum and peanut varieties and trials using phosphate fertilizer on sorghum and a calcium amendment on peanuts. Preliminary trial results reportedly show that improved sorghum and peanut varieties performed better than local varieties and that the response to applied phosphate fertilizer on sorghum and the calcium source on peanuts is obvious. Data from the 1995 trials are apparently still being analyzed and a statistical presentation is expected by the end of 1996.

The site characterization activities conducted to date have included site sampling from 65 soil profiles on approximately 400 hectares of land within the watershed. Soil analyses are currently underway on soils from six different soil series. A complete report on soil characterization will be ready as soon as the soil chemical analyses are available.

In addition to the soils work, two INRAN agricultural economists have undertaken a socio-economic survey. The survey is reported to have included 25 farmer respondents from four villages within the watershed. Information was gathered on farm size, number of fields per farm, farming systems in place, field occupation by crop, use of fertilizers, assessments of soil fertility by the farmers, indigenous knowledge of soil conservation techniques, and livestock inventories and socio-economic activities. Data from this survey are reported to be under analysis and a report is promised in the near future.

Finally, activities planned for biological site characterization and development of a topographic map for the watershed have been deferred to date due to "insufficient funds" (INRAN, 1995d; INRAN, 1995e).

2.3.3 Other InterCRSP Activities

In addition to onsite InterCRSP activities in the two watersheds, it was reported that:

- Hybrid sorghum seed production activities have been implemented at three INRAN station sites in Lossa, Maradi, and Birin-Konni;
- A study is planned on traditional methods of seed selection and conservation by farmers in Bengou, Tara, Madarounfa, Birin-Konni, Madaoua, and Tillabery; and
- A workshop to evaluate 1995 InterCRSP activities and plan for the 1996 growing season was held in January 1996 and involved representatives from all InterCRSP collaborators.

Finally, a regional workshop on natural resource management and InterCRSP in West Africa was held in Niamey in September 1995. The proceedings of workshop are well documented in a report published by the Integrated Pest Management CRSP (Integrated Pest Management CRSP, 1995).

3.0 CONCLUSIONS

3.1 Consequences and Impact of Training Programs on Future Research Activities and Institutional Development

In the opinion of the evaluation team, the participant training programs funded by USAID over the life of the NAAR Project have been the biggest implementation success of the NAAR Project. Project collaborators (i.e., USAID/Niger, INRAN, the technical assistance contractor, and the individual American universities and African institutions) substantially exceeded the original expectations of the NAAR Project. In addition, the skills mix among the persons trained appears to correspond well with the acknowledged weaknesses of and the expressed needs within Niger's agricultural research structures.

The success of participant trainees in completing their degree programs to date has been outstanding and the participants still in training will most likely complete their degree programs in like manner. As a result, a significant core of professional research and technical support expertise has been created and placed at the disposal of the major institutions conducting agricultural research in Niger. It is certain that without USAID/Niger consistent support for such training programs over almost two decades, INRAN and its affiliated institutions would have much less potential capacity to conduct quality research in a broad range of fields.

Post-degree attrition from INRAN has been low overall. It has, however, been disappointing at the Ph.D. level, where 50 percent of degree holders have resigned from their positions with INRAN since 1994 (i.e., one as INRAN Director General and two as INRAN Scientific Directors). Although these losses have deprived INRAN of significant leadership and brainpower at a time when such assets are sorely needed, the situation is not entirely bleak since two of the Ph.D. recipients continue to work in Niger in positions at UNDP and ICRISAT where they can conceivably have substantial influences on in-country agricultural research; and the third works for the West Africa Rice Development Association in regional rice development programs.

The principal questions remaining about the effective legacy of USAID/Niger's consistent and successful effort to train agricultural research specialists and support staff for Niger are:

- Can the potential of the trained cadre be realized within the structure and operations of Niger's present agricultural research institutions?
- What can USAID contribute in the future to maximize the accomplishments and impacts of the researchers and support staff trained for the benefit of agricultural development?

The following sections address these questions.

3.2 NAAR Project Contributions to Research Output and Institutional Development at INRAN

Contributions of the NAAR Project to its stated goal, purpose, and objectives after June 1990 (apart from the human resources development provided by the training component) must be considered feeble at best. No doubt, much of the Project's failure to attain long-term effectiveness is due to the disruptions and/or confusions in INRAN/NAAR Project relationships caused by USAID's decertification of INRAN in 1990. For whatever reason, important institutional deficiencies remained essentially untouched throughout the NAAR Project assistance, despite the opportunity for INRAN researchers to conduct large numbers of trials and despite some progress toward improving irrigation research.

The problems that the World Bank-supported Projet National de Recherche Agricole (PNRA) currently faces illustrate the lack of progress that INRAN has made to date in many areas for which the NAAR Project was designed to help. The *Aide-Mémoire* of the March 1995 PNRA midterm evaluation team (INRAN, 1995a) summarized the 1990 INRAN shortcomings (i.e., before the initiation of PNRA activities) as:

- A weak research-farmer dynamic that did not allow integration of all farmer concerns into research planning;
- Poor targeting of research on real development problems;
- Lack of appropriate impact indicators to measure INRAN results on extension messages for farmers and on agricultural production in Niger;
- Weak ties between INRAN and its immediate scientific environment and weak synergies with ICRISAT and the Université Abdou Moumouni in Niamey;
- Organization of institutional structures that does not respect basic principles of efficiency and transparency in management;
- No effective system for research program planning;
- Insufficient research emphasis on livestock and irrigated agriculture;
- Excessive centralization of agricultural research management at INRAN headquarters in Niamey;
- An inappropriate *statut juridique* governing INRAN and its personnel;
- Program budgeting that does not meet any recognized norms; and
- Overburdening of research staff with too many management duties.

The *Aide-Mémoire* credits the PNRA with making some progress toward improving conditions within INRAN. Actions cited include: the reorganization of INRAN management structures; the elaboration of a research strategy for the period 1994 to 1998 (in which NAAR Project staff participated); and the re-prioritization of research activities to give increased importance to livestock, natural resource management, and irrigation (the latter two of which were also subjects of NAAR Project work). In addition, there has been a reduction in INRAN research programs

from over 100 in 1990 to approximately 25 currently. Finally, operational ties with ICRISAT have been strengthened and everything is in place for the first-ever INRAN research staff evaluation, although the evaluation itself will not begin until 1997. Long-term graduate-level training of INRAN researchers, well-begun under NAAR and other USAID projects, will continue through the PNRA. Current plans anticipate Ph.D. and M.S. degree training for up to 17 individuals, eight of whom have already left Niger to begin their studies.

Nevertheless, serious problems were reported at INRAN including the Government of Niger's repeated failures to make timely payments of its national recurrent cost contributions to the PNRA, poor financial and internal management controls, lack of an effective program for applied research-extension-farmer research collaboration, lack of an INRAN monitoring and evaluation system, and continued poor liaison with technology end users. In particular, long-standing problems were reported to include continuing failures to establish procedures for evaluating and promoting researchers based on performance, revise the *Statut* and the *Règlement Intérieur* of the Institute, establish and/or regularize relationships with ICRISAT and the Université Abdou Moumouni, institute an external Scientific and Technical Council, and maintain functional multidisciplinary Regional Agronomic Research Committees.

The Regional Agronomic Research Committees, for example, are currently operational in only two regions, and, although they were originally anticipated to meet yearly, they are reported to meet no more frequently than every two or three years. Research/extension linkages between PNRA and the parallel World Bank-supported Programme de Renforcement des Services d'Appui à l'Agriculture (PRSAA) are universally seen as very weak.

The midterm evaluation *Aide-Mémoire* also pointed out that barely one-quarter of the original $19,900,000 credit authorized for the PNRA had been spent and recommended an almost 50 percent reduction in the project's budget. This reduction was, in fact, not instituted, but it appears unlikely that much more than 50 percent of the available funds -- budgeted chiefly for civil works, vehicle and equipment procurement, and operational expenses -- can be spent in the remaining two years of the project.

The RELU, instituted by the NAAR Project, continues to function at INRAN headquarters, with a unit coordinator claiming that most activities (i.e., explanations of trial protocols, training of extension agents for on-farm trials and demonstrations) are now decentralized to three regions. No trial protocols or analyses of past trials were available at the RELU in Niamey. These documents are now apparently held only by the researchers who design and analyze the trials or, during the growing season, by the extension agents monitoring field trials.

Researchers are encouraged to do as much of their work as possible on-farm, but their ability to follow and maintain quality controls over these trials, even with the assistance of the RELU, appears to be woefully inadequate. It is reported that many trial sites are not visited by responsible

principal researchers during the growing season. In 1995, for example, the RELU coordinated on-farm trials, tests and demonstrations financed by the PNRA on approximately 20 themes with 867 farmers in the Departments of Dosso, Maradi, Tillabery, and Zinder. Several themes (e.g., sorghum varietal testing, sorghum and millet fertilization trials) were repeated many times, with each set of trials financed by a different project or program, and with little apparent research rationale. Protocols, field data sheets, and trial analyses for these activities were not available. Scope for improvements in the prioritization and coordination of on-farm program activities, therefore, appears great.

Available *fiches techniques* reviewed were of highly variable quality. They tended to be either insufficiently flexible to permit extension agents to make appropriate recommendations from a range of alternative strategies as a function of seasonal uncertainties, or too long and complex for extension agents and farmers to understand and assimilate based on the training provided by INRAN and the extension services. These deficiencies were reported by Okali *et al.* (1994) and, unfortunately, were still evident to the evaluation team in 1996.

NAAR Project research did provide on-the-job guidance to several INRAN researchers, particularly in the design, implementation, analysis, and reporting of individual research trials and program themes. There is little evidence, however, that much capacity for research planning and prioritization was institutionalized as a direct result of NAAR Project technical assistance team collaboration with INRAN staff. Comparing current research programs with those conducted during (or even before) the NAAR Project, it is evident that much of the same work is being repeated again and again, with little apparent consideration of previous results and conclusions. This failure of the INRAN system, at least for research on rainfed crops, indicates serious shortcomings in the long-term research prioritization process.

Inclusion of INRAN research staff in the writing of more of the refereed journal articles drawn from NAAR Project research would have furthered their integration into the international community of researchers recognized as producing quality research. Given that much of the NAAR Project's research has not yet resulted in widespread adoption of the technologies generated and tested, the additional failure to share the most widespread, prestigious form of professional recognition (i.e., published research papers) with INRAN staff indicates that the more tangible benefits of the NAAR Project may have accrued primarily to researchers at American universities, rather than to researchers at INRAN in Niger.

3.3 Contributions of InterCRSP Activities

To date, the major contributions of InterCRSP activities in Niger have been:

- The introduction of a unifying concept for research; and
- Demonstration, in planning at least, of a working methodology for collaborative field activities between INRAN, ICRISAT, and the several participating CRSPs.

Use of watershed management for sustainable development, to the extent that it focusses research orientations on critical water management and soil fertility concerns, as a unifying concept appears to be a reasonable point of departure in developing an effective joint research agenda for Sudano-Sahelian conditions in Niger. Selection of two small watersheds with contrasting production environments should be a constructive step. And, finally, if integration of field activities leads to more cost effective implementation of the research agenda, it will be a very positive outcome for Niger in an era of sharply declining USAID resources.

Collaborators in any future InterCRSP activities must ensure that research agendas do not simply deteriorate into a collection of discrete CRSP, ICRISAT, or INRAN field trials carried out within a defined geographic area but with no integration. If such a deterioration is allowed to happen by omission or commission in future InterCRSP activities, the result will be a reoccurrence in a microcosm of INRAN's national research agenda, with all its multiplicity of activities and fuzziness in orientation. In this regard, an integrated program approach based on increasing productivity through improved water management and increased soil fertility should ensure that a determined effort is made to select the best elements from amongst the varied resources INRAN, ICRISAT, and the CRSPs can bring to bear on Nigerien problems. Participation in a watershed or in the overall program should not be based simply on the existence of a particular CRSP and the need to find a place for it to work in the InterCRSP.

Due to various startup problems with the InterCRSP, including the delay by the individual CRSPs in actual disbursement of USAID/Niger funding for field activities until September 1995, it was reported to the evaluation team that actual collaboration in implementation of field activities during the 1995 growing season was limited. ICRISAT researchers conducted most of the fieldwork in the Tanda watershed and INRAN researchers installed some limited trials in Hamdallaye. More active collaboration between the partners is said to have occurred in 1996 in the Tanda watershed. Work in Hamdallaye continues to be a combination of agronomic trials initiated by INRAN researchers and carry-over activities initiated in the early 1990s by the TROPSOILS CRSP.

Given that only limited InterCRSP field activities were initiated with the 1995 growing season and that no data or analyses from the new trials in 1995 or 1996 have yet been released, the evaluation

team has no basis for comment on program outputs to date. Initial field trial results and analysis is promised by the end of 1996.

4.0 RECOMMENDATIONS

- Based on CRSP research findings to date, InterCRSP activities, to be effective, should concentrate on integrated actions within the unifying theme of increasing productivity through improved water management and increased soil fertility.
- Within the context of USAID support for regional InterCRSP activities, maximum efforts should be made to involve INRAN researchers in the design, implementation, analysis, and publication of quality research in Niger and within the region.
- USAID should support InterCRSP efforts which further, or at least do not undermine efforts by INRAN (a) to plan and implement research as a function of a rational long-term research strategy, and (b) to strengthen institutional research/extension/farmer linkages.
- In the context of the World Bank/INRAN, PNRA, and PRSAA, INRAN should make every effort to constitute an external Scientific and Technical Council to provide effective and detailed peer reviews of INRAN research planning and operations.
- INRAN should implement its planned research staff evaluation early in 1997 to provide the basis for providing greater incentives to researchers based on the volume and quality of their work.
- INRAN should ensure that regular meetings of decentralized research planning/evaluation organs, such as the Regional Agronomic Research Committees, are held and that effective operational research/extension/farmer linkages are developed using decentralized research/extension *équipes pluridisciplinaires* to allocate resources to on-farm adaptive research and to support technology dissemination with farmers.
- USAID should continue efforts to install effective regional nodes for internet communications to facilitate two-way E-mail and/or other types of communication between researchers and to provide appropriate access for researchers to international agricultural library resources throughout the world;
- USAID should continue to support regional research networks for millet, sorghum, cowpeas, rice and natural resource management; and
- USAID, through the InterCRSP or other means, should endeavor to provide independent research grants for researchers in the region to further specific work and to facilitate production of jointly-authored scientific papers with colleagues at American universities and/or international research centers.

5.0 LESSONS LEARNED

- Lack of external funding has not been the binding constraint on the development of increased research capacity at INRAN over the last decade as demonstrated by the fact that INRAN has consistently failed to exploit or effectively manage the funds already provided to it by USAID, the World Bank, and other donor agencies.
- Effective political and consistent financial support by the Government of Niger are essential to strengthening and sustaining research capacity at INRAN and ONAHA. Neither has been forthcoming over the last decade.
- Research agendas need to be responsive to the requirements of specific farming systems and sharply focussed to produce useful technology transfer messages. Such prioritization and responsiveness are still not evident in current INRAN operations, even though total research efforts have recently been reduced from over 100 to about 25 programs.
- Continuity in senior leadership within INRAN is vital to the development and implementation of agricultural research programs. This has not been the case in the recent past since INRAN has had four different Directors General and six different Scientific Directors since mid-1990.
- Professional training is a necessary but not sufficient condition to the development and dissemination of viable agricultural technologies for Nigerien farmers.
- Training researchers and support staff requires a supportive institutional environment that provides necessary intellectual and material support, recognizes quality in research, and rewards individual and team initiatives in tangible ways.
- If a supportive institutional environment for quality research cannot be developed at INRAN, more motivated researchers, particularly those with Ph.D. degrees, will increasingly seek more satisfying work in regional and international research and development networks.
- A separate RELU within INRAN will be successful only to the extent it actually conducts quality, farmer-driven on-farm research over time in daily collaboration with extension services, and this in a manner decentralized enough for researchers responsible for trials to keep close track through the season(s) of crop or animal comportment, data collection processes, and anomalies and problems encountered.
- The farming/herding environment of the Sahel, characterized by highly variable agroclimatic conditions and high levels of associated risk, requires that support of agronomic research institutions like INRAN be consistent and long-term, to encourage viable, coherent long-term research programs.

ORIGINAL STATEMENT OF WORK

ARTICLE I - TITLE

NAAR Project Evaluation and Lessons Learned from USAID/Niger's Technology Development and Transfer (TDT) Programs.

ARTICLE II - OBJECTIVE

USAID's TDT interventions in Niger have been primarily the (1) Niger Applied Agricultural Research (NAAR) Project funded by USAID-Niger and (2) the centrally funded Collaborative Research Support Programs (CRSPs).

1. The NAAR Project

The Niger Applied Agricultural Research (NAAR) Project (683-0256) was authorized in 1987 as a phase two of the Niger Cereals Research (NCR) Project (683-0225) which was authorized in 1982 and was completed in 1988. The NAAR Project also included elements of the proposal for Applied Irrigation Research and Coordination (AIRC) Project (683-0250) which was approved by AID/W in 1986 with a recommendation to merge its planned activities with phase two of the NCR Project, i.e., the NAAR Project.

The goal of the project was to increase agricultural production and to diversify sources of rural income, while the purpose was to help the National Agricultural Research Institution of Niger (INRAN) to institutionalize a system of applied agronomic research characterized by strong functional linkages to extension. The main project outputs were expected to be: (1) strengthening of INRAN's institutional capacity to design, administer, manage and carry out applied agricultural research programs through planning and management activities, human resources development, and strengthening of support services to research; (2) development and execution of specific priority multi-disciplinary research programs on Niger's principal rainfed and irrigated food crops; (3) a functional research-extension coordinating unit.

A mid-term evaluation of the program, conducted in June 1990, gave a positive overall assessment of the program's performance, but found that the human resources development component was lagging behind. The evaluation recommended that the PACD be extended through July 1993 with a focus on management and human resources development to enable MS and PhD training participants in the U.S. to complete their training programs and return home to staff INRAN. A World Bank agricultural research support project was initiated in 1990 and was expected to provide INRAN with additional support in other areas. Furthermore, following an audit of the NAAR project management by INRAN, the institute was decertified by AID in 1991.

Since the mid-term evaluation in June 1990, the project activities consisted mostly of managing training participants in the U.S., most of whom returned home by 1993. In 1993, the project was amended first to extend its PACD to May 1997, and secondly to expand areas of training to include irrigation and related training. Program activities in 1993 and 1994 focussed mainly on the development of a training plan for INRAN. New training participants were sent out only in 1995, mostly to African universities and training centers. Six of them are still in training.

Lesson learned prior to June 1990 are accessible through the NCR project evaluation reports and through the NAAR mid-term evaluation report. **Only the achievements of the program from June 1990 to present still need to be assessed to derive relevant lessons learned.**

2. The CRSPs

Three Collaborative Research Support Programs (CRSPs) between U.S. universities and the National Agricultural Research System have been active in Niger during the past decade. These include: INTSORMIL, TROPSOILS and the PEANUT CRSPs. These programs have provided support to INRAN through long-term degree training of its staff in American universities, through on-the-job training, and supply of laboratory equipment and other resources for conducting collaborative research activities in U.S. universities.

Through these programs, many of the INRAN staff trained under the NAAR Project received financial and scientific support from their former U.S. university partners to conduct high quality research in Niger and in the U.S.. The CRSP programs and the NAAR thus played complementary roles in building up the research capacity of INRAN.

The InterCRSP initiative supported by USAID/Niger and initiated in 1995 led in the case of Niger at least to collaborative research activities of the CRSPs on natural resource management technology development and transfer in Niger. Since 1996 under USAID/Niger's financial support, CRSPs are providing support to INRAN under the "InterCRSP" umbrella.

B. Objective

The objective of this delivery order is to provide an assessment which will (1) draw lessons learned from the last 7-8 years of USAID/Niger's investment in agricultural and natural resource management technology development and transfer, and (2) provide recommendations to the West African Regional InterCRSP Project for future assistance.

ARTICLE III - STATEMENT OF WORK

The Contractor assessment team shall perform the tasks mentioned below and include the results in an assessment report in accordance with ARTICLE IV - REPORTS. The Contractor team shall:

1. Based on a review of key documents (mentioned below) and interviews with key respondents, synthesize lessons learned up to the present with respect to the following:

   -- institutional development of INRAN;
   -- research planning and prioritization;
   -- relevance of research undertaken to Niger's production problems;
   -- research coordination with CRSPs and other institutions (e.g., ICRISAT, ICRAF, etc.);
   -- farmer participation in research planning; and
   -- research-extension linkages.

2. Assess the specific achievements, contributions and constraints of the NAAR Project and CRSPs from 1990 to present and derive lessons learned in the process.

3. Evaluate the overall impact of the NAAR Project and the CRSPs to the present with respect to:

   (a) its institutional and human resources development objectives and the extent to which INRAN has been able to retain trained researchers, and
   (b) with respect to its contributions for agricultural production and productivity increases in Niger.

4. Identify specific agricultural and NRM technologies developed under the NAAR Project and the CRSPs, and the degree to which their transfer to rural producers was undertaken and the constraints thereof.

5. Synthesize lessons learned from the above with respect to (a) technology development and transfer (TDT), (b) developing research-extension-NGOs-farmers linkages under the NAAR Project and under the CRSP activities funded by USAID/Niger. In so doing, emphasize causes of success, causes of failures, opportunities missed and make recommendations for future TDT assistance to Niger by USAID through the InterCRSP or through other donors.

6. Produce, using the evaluation results, the first draft of the NAAR Project Evaluation Summary (PES) to be finalized by the USAID/Niger project officer.

The following are suggestions that the team should take into account in conducting the assessment.

1. Institutions to Visit

-- USAID/Niger in Niamey
-- INRAN headquarters and stations around Niamey and Maradi
-- ICRISAT Sahel Center in Niamey
-- ONAHA headquarters and stations around Niamey
-- Ministry of Agriculture, Rural Development and Hydrology
-- Ministry of Scientific Research in Niamey
-- University of Niamey, faculty of Agricultural Sciences
-- USAID/Niger NRM NGO partners' headquarters in Niamey and Maradi.

2. Background Reading Documents

-- The NCR and NAAR project documents and evaluation reports
-- The CRSP and InterCRSP project documents and evaluation reports
-- The regional agricultural research network documents related to Niger, for maize, rice, cowpea and sorghum research.
-- Agreements or MOUs signed between:

USAID/Niger and the Niger Government related to TDT, CRSPs and INRAN;
ICRISAT and INRAN;
IITA and INRAN;
WARDA and INRAN;
SAFGRAD and INRAN;
USAID/Niger and Peace Corps/Niger.

-- Annual reports, including administrative, financial and research reports of INRAN, as well as other miscellaneous progress reports of INRAN to the Niger Government and to USAID.
-- The annual reports of the CRSPs as related to Niger.
-- The annual reports of the regional agricultural research networks.
-- The annual reports of ICRISAT, IITA, WARDA as related to Niger.
-- Annual reports of ONAHA (Office National des Amenagements Hydro-Agricoles).
-- Audit reports of the NAAR Project.

-- The World Bank project (PRN) documents.
-- The annual report of the extension services.
-- The annual report of the Ministry of Agriculture and Rural Development.

3. Interviews to be conducted by the team with the following:

-- The training participants, about 26, who finished their training and are presently in Niger. The list of such participants is shown in Annex. Most are working for INRAN or ONAHA in the Niamey area. In such interviews, the team will assess the participants level of satisfaction with the training received, usefulness of such training for current duties and responsibilities, post training constraints that may prevent effective and productive use at INRAN or ONAHA of training received,

-- INRAN Director, Deputy Directors and Heads of Department. In particular, the Director General, the Deputy Director in charge of Administrative and Financial Affairs (DAAF), the Scientific Director, the heads of the technical research departments, the head of the Research-Extension liaison unit. Such interviews are expected to help identify factors that constrained or helped program implementation, program effectiveness and efficiency, and will also help identify opportunities missed in program design and implementation.

-- The National Coordinators of the three CRSPs, of the InterCRSP, and the National Coordinators of the regional agricultural research networks. The names and locations of such individuals are shown in the Annex.

-- The Director of the Office National des Amenagement Hydro-Agricoles (ONAHA). This institution also benefitted from the training program.

-- USAID/Niger staff involved in the NAAR Project management.

ARTICLE IV - REPORTS

In accordance with ARTICLE III - STATEMENT OF WORK, the Contractor team shall submit an assessment report which shall include, at a minimum, all of the requirements specified in Article III. The Contractor team shall submit one copy of the draft assessment report to the Project Officer or his designee specified in block 5 of the delivery order cover page prior to departure from Niamey. The entire team shall present the results of the assessment in a debriefing session to USAID/Niger Mission officials prior to departure from Niamey. The Contractor shall submit ten (10) copies each in both English and French of the finalized report, incorporating the Mission's comments, no later than September 27, 1996.

ARTICLE V - TECHNICAL DIRECTIONS

Technical directions during the performance of this delivery order shall be provided by the USAID/Niger Chief, Natural Resources Management and Agricultural Division, who is the Project Officer for this delivery order, pursuant to section F.10. of the contract. The Contractor shall also coordinate with INRAN General Director, Dr. Gouro Abdoulaye Soumana. The head of the Contractor team shall brief the Project Officer or his designee about progress made at least one per week.

ARTICLE VI - TERMS OF PERFORMANCE

A. The effective date of this Delivery Order is August 23, 1996 and the estimated completion date is September 27, 1996.

B. Subject to the ceiling price established in this Delivery Order and with prior written approval of the Project Manager (see Block No. 5 on the Cover Page), the Contractor is authorized to extend time of completion of the work, including the furnishing of all desirables, to extend beyond 30 calendar days from the original estimated completion date. The Contractor shall attach a copy of the Project Manager's approval for any extension of the term of this Delivery Order to the final voucher submitted for payment.

C. It is the Contractor's responsibility to ensure that the Project Manager-approved adjustments to the original estimated completion date do not result in costs incurred which exceed the ceiling price of this Delivery Order. Under no circumstances shall such adjustments authorize the Contractor to be paid any sum in excess of the Delivery Order.

D. Adjustments which will cause the elapsed time for completion of the work to exceed the original estimated completion date by more than 30 calendar days must be approved in advance by the Contracting Officer.

Work Plan for Evaluation of NAAR Project and CRSP/InterCRSP Activities in Niger: Lessons Learned [26 August - 27 September 1996]

8/26-30/1996	Arrival of U.S. team members. Initial contacts with USAID Niamey. Recruitment of local hire consultant. Identification and collection of pertinent documents for review. Meetings with acting Director General and acting Scientific Director at INRAN headquarters; and with InterCRSP Coordinator at INRAN Soils Laboratory. Outline of work plan and final report.
8/31/1996	Review of NAAR, NCR and CRSP reports as available. Correction and completion of list of researchers trained under NAAR. Arrangement of meetings with Kollo and Niamey INRAN ex-trainees.
9/2/1996	Meeting with UNDP head of NRM and sustainable agriculture program (9 a.m.). Group meetings and individual interviews with INRAN researchers trained under NAAR training program (11 a.m. at Kollo and 4 p.m. at INRAN headquarters).
9/3/1996	Meeting with World Bank agricultural research projects coordinator (10 a.m.). Liaison meeting with InterCRSP evaluation team. Schedule visit to ICRISAT Sahelian Center at Sadore. Continue review of documents. Interviews with returned trainees.
9/4-6/1996	Field visits to INRAN research sites at Hamdallaye, Tanda and Gaya. Visit to the ICRISAT Center at Sadore (coordinated with InterCRSP evaluation team). Continue review of documents. Interviews with returned trainees.
9/7/1996	Continue review of documents. Interviews with returned trainees.
9/8/1996	If deemed necessary, travel by local consultant to INRAN Stations in Maradi and Birnin-Konni to interview returned trainees and visit their research sites.
9/9/1996	Local consultant in Maradi and Birnin-Konni to interview returned trainees and visit their research sites. Rest of team begins draft report.
9/10/1996	Local consultant returns to Niamey from Maradi and Birnin-Konni. Team work to draft report. Continue interviews with returned trainees.
9/11-12/1996	Team work to draft report. Complete interviews with returned trainees.

9/13/1996 Oral presentation/debriefing. Submission of draft report. Departure for U.S. of John Eriksen. End of local hire contract.

9/15-26/1996 Departure of John Russell (9/15/1996. Finalization of report in U.S.

Outline of Draft Report on Evaluation of NAAR Project and InterCRSP Activities in Niger: Lessons Learned

26 August - 27 September 1996

Prefaces

Title Page
Executive Summary
Table of Contents
List of Acronyms

Main Report

1. Introduction

   A. Background on NAAR project goals, objectives, history, and on past CRSP/InterCRSP activities in Niger, before December 1994 evaluation.
   B. Objectives of present evaluation
   C. Methodology Used

2. Findings

   A. Training Program: people trained, degrees, specialties, current work and status
   B. InterCRSP activities since 1994 CRSP evaluation
   C. NAAR activities since mid-term review in June 1990; technologies developed, extended.

3. Conclusions

   A. Consequences and impact of training program on future research activities and institutional development.
   B. Likely contribution of InterCRSP activities
   C. NAAR contribution to research output and institutional development of INRAN.

4. Recommendations

5. Lessons Learned

Appendices

Appendix A: Original Statement of Work and Approved In-Country Work Plan
Appendix B: Team Itinerary
Appendix C: List of Persons Contacted

Appendix D: Technical Annex
Appendix E: Bibliography

Note: Report, exclusive of appendices, will be limited to 30 pages.

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TEAM ITINERARY

8/26 Russell arrives Niamey.

8/27 Russell meets with USAID NAAR project management staff at USAID/Niger, collects and reviews relevant documentation, identifies and interviews local consultant candidates.

8/28 Russell continues to meet with USAID/Niger staff, review NAAR and CRSP reports. Eriksen arrives Niamey.

8/29 Expatriate team continues to review documents. Third local consultant candidate interviewed and asked to complete biodata form.

8/30 Local consultant is hired contingent upon approval of his daily rate by the USAID contracts officer visiting Niamey mission.

Expatriate team members meet with Curt Nissly, George Thompson, and Moussa Saley to agree main points of the evaluation team workplan.

Appointments with senior INRAN and InterCRSP staff arranged.

Meeting of full evaluation team with INRAN Acting Director General and Acting Scientific Director.

Meeting of evaluation team with INRAN InterCRSP Coordinator.

Revised evaluation team workplan and report outline submitted to USAID.

Introduction of report and Appendix A drafted. Drafts of Appendices C and E begun.

Workplan, report outline, and local consultant CV and biodata faxed to Tropical Research and Development, Inc.

8/31 Review of NAAR, CRSP reports continues. Draft of report Appendices B and D begun. List of long-term NAAR participant trainees corrected and updated. Trainees now in Niamey and Kollo contacted for meetings/interviews to be held on 09/02.

9/1 Review of NAAR Project and CRSP documents.

9/2 Evaluation team meets with head of UNDP natural resources unit.

Team meets with INRAN Kollo staff trained by NAAR Project at CERRA/Kollo.

Team meets with INRAN staff trained by NAAR Project at INRAN Headquarters in Niamey.

Review of pertinent documents continues. Two sections of draft evaluation report introduction written.

9/3 Russell meets briefly and separately with Curt Nissly and George Thompson to get USAID/Niger feedback on and approval of evaluation team work plan and draft report outline

Evaluation team meets with Mr. Salifou Mahaman, Program Officer at World Bank Resident Mission in Niamey.

Evaluation team meets with Dr. Karl Harmsen, Executive Director, and with Drs. Ousman Youm, Bill Payne and Jo-Jo Baidu-Forson at the ICRISAT Sahelian Center at Sadore.

9/4 Evaluation team visits Hamdallaye watershed project with InterCRSP coordinator, InterCRSP/Soil Management CRSP Watershed Management Project Evaluation Team. Meets with INRAN Soil Lab and University of Niamey researchers in the field.

Russell and Eriksen make appointments with NGOs in Niamey; meet with Mr. Bob Brown, U.S. Peace Corps/Niamey and with Marilyn Knierimen, Administrative Director of CARE International.

Moussa Adamou reviews documents concerning InterCRSP watershed management project.

9/5 Moussa Adamou visits farmers in Hamdallaye watershed with InterCRSP/Soil Management CRSP Watershed Management Project Evaluation Team.

Russell meets with Director and Associate Director of the Direction Nationale de l'Agriculture.

Report drafting continues.

9/6 Meetings with a representative of Cellule de Gestion des Ressources Naturelles of the World Bank project and with the Coordinator of the INRAN/Niamey Research-Extension Liaison Unit.

Contract for local consultant received from TR&D and signed.

Evaluation team attends debriefing of the InterCRSP/Soil Management CRSP Watershed Management Project Evaluation Team at USAID/Niger.

9/7 Review of pertinent documents and drafting of the report.

9/8 Moussa Adamou travels from Niamey to Maradi for interviews. Eriksen and Russell continue to draft main report and appendices.

9/9 Eriksen continues writing of draft main report.

Russell interviews USAID training officer and training assistant, obtains updated list of NAAR participant trainees, a different version of latest training plan, and additional documents relating to TDT in Niger, including 1995 RELU workplan from INRAN/RELU coordinator.

Moussa Adamou interviews returned NAAR participant trainees and other INRAN staff in Maradi.

9/10 Moussa Adamou interviews INRAN staff, visits INRAN research activities in Birnin-Konni and returns to Niamey.

Eriksen and Russell meet with USAID Controller and Assistant Controller, USAID Training Office staff, and continue to draft report.

9/11 Moussa Adamou drafts report annex on his findings from the trip to Maradi and Birnin-Konni.

Russell interviews World Bank PNRA Program Officer and Peace Corps Associate Director for Agriculture/Natural Resources.

Team continues to draft and edit report.

9/12 Final in-country editing, printing, duplication and distribution of the draft report.

Team meeting with the INRAN Director General.

9/13 Debriefing at USAID/Niger.

Eriksen departs for the United States.

9/14 Revision of the draft report begins to incorporate USAID/Niger and INRAN comments as appropriate. Supplementary interviews held as necessary in Niamey.

9/15 Russell departs for the United States.

9/16-
9/27 Finalization of evaluation report, duplication and transmittal to USAID/Niger.

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LIST OF PERSONS CONTACTED

United States Agency for International Development

Mr. John J. Katt	Chief/Office of Financial Management
Mr. Aliouna Camara	Chief Accountant/Office of Financial Management
Mr. George R. Thompson	Chief/Environment, Resource Management and Development
Mr. Curtis R. Nissly	Project Manager/Office of Natural Resource Management and Agriculture
Mr. David Miller	Deputy Project Manager/Office of Natural Resource Management and Agriculture
Commandant Moussa Saley	Deputy Project Manager/Office Natural Resource Management and Agriculture

Institut National De Recherche Agronomique du Niger

Dr. Moussa Oumarou	Director General, a.i.
Mr. Toukoua Daouda	Scientific Director, a.i.
Dr. Mahaman Issaka	Soil Scientist/Fertility and InterCRSP Coordinator
Dr. Ly A. Samba	Agricultural Economist/Chief of Program for Production Systems and Transfer of Technology
Dr. Moussa Adamou	Sorghum breeder at Kollo Research Station/former Scientific Director
Mr. Chetima Mai Moussa	Irrigation Engineer/National Coordinator/Regional Program for Research on Irrigated Systems
Mr. Alou Abdourhaman	Rice researcher at Kollo Research Station/ Coordinator for the WARDA rice research network
Mr. Seyni Sirifi	Sorghum/cassava researcher at Kollo Research Station
Mr. Adam Aboubacar	Food technology researcher/Ph.D. candidate at Purdue University
Mr. Issoufou Kapran	Sorghum breeder
Mr. Gonda Jada	Plant Breeder/Maradi
Mr. Abdoulaye Tahirou	Agricultural Economist
Ms. Ibro Germaine	Economist
Mr. Moussa Salu	Researcher
Mr. Zanguina Ibrahim	Researcher at Hamdallaye
Mr. Amadou Yayi	Field Observer at Hamdallaye
Mr. Farmo Amadou	Information and Publications Division in Niamey
Mr. Cherif Ari	CERRA/Maradi

Mr. Diallo Soumana Amadou	CERRA/Maradi
Mr. Mahamadou Ibrahim	CERRA/Maradi
Mr. Issa Mahamane	CERRA/Maradi

Direction for Agriculture

Mr. Chipkao Idrissa	Director
Mr. Atchabi Abou	Deputy Director

Cellule de Gestion des Ressources Naturelles

Mr. El Hadji Maman Saadou	Specialist for Water and Forestry

University of Niamey

Dr. Aroukou Adarou Israltim	Professor/Faculty of Agronomy/Plant Genetics and Breeding

Icrisat Sahelian Center

Dr. Karl Harmsen	Executive Director for West and Central Africa
Dr. Ousman Youm	Research Scientist
Dr. Bill Payne	Research Scientist
Dr. Jo-Jo Baidu-Forson	Agricultural Economist

World Bank

Mr. Salifou Mahaman	Program Officer, World Bank Resident Mission

United Nations Development Program/Niamey

Dr. Mamadou Ouattara	Senior Environmental Advisor for Sustainable Development

United States Peace Corps

Mr. Robert Brown II	Administrative Officer
Mr. Eric Lindberg	Associate Director

Union Mondiale Pour La Nature

Dr. Thomas L. Price	Deputy Representative for Social Sciences

AFRICARE

Mr. Aaron G. Marshall, Jr.	Resident Representative
Dr. Mohamoud Osman	Project Director/Natural Resources Management Project at Goure, Niger

CARE International

Ms. Marilyn Knierimen	Administrative Director

Other Respondents

Mr. Zakary Garba	Director of Bureau de Realisation Technique, d'Etude et de Conseil (BURTECO) and former Director General of INRAN
Mr. Mamane Mamadou	Planning Advisor on Sustainable Development to the Direction Nationale de l'Environment du Niger
Dr. Andrew Manu	Team Leader/InterCRSP Evaluation Team/Associate Professor, Alabama A&M University, Normal, Alabama
Dr. Johnny W. Pendleton	Agronomist/InterCRSP Evaluation Team/Adjunct Professor, University of Illinois, Champaign-Urbana, Illinois

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INFORMATION ON NIGERIEN NAAR TRAINING PARTICIPANTS

A. Participants Who Have Completed USAID-Sponsored Long-Term Training

1. Diallo Soumana Amadou -- Master of Science in soil science from the University of Arizona. Returned to Niger in January 1989. Currently working at INRAN research station in Maradi.

2. Alou Abdourhamane -- Master of Science in plant science from the University of Arizona. Returned to Niger in February 1990. Currently working at INRAN Departement Recherche Agricole in Niamey. Since 1991, rice researcher in agronomy and plant breeding. Local coordinator for the WARDA rice research network.

3. Sabiou Mahaman -- Master of Science in agronomy from the University of Arizona. Returned to Niger in March 1990. Currently working at the INRAN research station in Diffa.

4. Ouattara Mahamadou -- Ph.D. in soil science from Texas A&M University. Returned to Niger in May 1990. Worked as the INRAN Scientific Director from 1991 to 1992 and as Director General from 1992 to August 1994. Currently working at UNDP in Niamey as the advisor on natural resource management and sustainable agriculture.

5. Moussa Adamou -- Ph.D. in plant breeding at Mississippi State University. Studies financed by the NAAR Project and Sahel Human Resources Development Project during the course of the NAAR Project. Returned to Niger in May 1990. Has served as the principal sorghum plant breeder at INRAN Station in Kollo. Was INRAN Scientific Director from 1992 to 1993.

6. Ouendeba Botorou -- Ph.D. in plant breeding from Kansas State University. Returned to Niger in December 1991. Worked as INRAN Scientific Director from 1995 until May 1996. He was also the head of the Programme Cultures Pluviales and the coordinator of INTSORMIL CRSP activities in Niger. Currently working for ICRISAT at the Sahelian Center in Sadore as the coordinator of the Swiss-sponsored millet research network ROCAFREMI.

7. Boukari Ari -- Ingenieur degree in agronomy from Institut Agronomique in Bouake, Cote d'Ivoire. Returned to Niger in February 1991. Currently working for ONAHA in Niamey.

8. Ms. Sani Mariama -- Ingenieur degree in agricultural engineering from the Ecole Inter-Etat des Ingenieurs de l'Equipement Rural in Ouagadougou, Burkina Faso. Returned to Niger in September 1991. Currently working at the Direction Hydrolique at the Ministry of Agriculture and Rural Development in Niamey.

9. Chetima Assane -- Started Ingenieur program in civil engineering at the Ecole National des Ingenieurs in Bamako, Mali but terminated early. Ingenieur degree from the Centre Regional de Teledetection in Ouagadougou, Burkina Faso. Returned to Niger in October 1992. Currently working at ONAHA in Niamey.

10. Alirou Ide Maiga -- Diploma from the Centre Regional de Teledetection in Ouagadougou, Burkina Faso. Returned to Niger in January 1992. Currently working for INRAN Departement Recherche Ecologique in Niamey.

11. Aboubacar Adam -- Master of Science in food technology from Purdue University. Returned to Niger in February 1992. Worked at the INRAN Soils Laboratory in Niamey. Recently received an assistantship for Ph.D. studies in soil science and returned to Purdue University.

12. Ousmane Taher -- Ingenieur degree in hydrology and engineering from the Ecole Nationale des Travaux Publique in Ndjamena, Chad. Returned to Niger in July 1992. Currently working for ONAHA as a project director in Gaya.

13. Ly Samba Abdoulaye -- Doctorate 3eme Cycle in agricultural economics at CIRES in Abidjan, Cote d'Ivoire. Studies financed by the Sahel Human Resources Development Project during the course of the NAAR Project. Returned to Niger in January 1993. Served as Chief of INRAN/DECOR from October 1991 to August 1994. Was researcher in INRAN/DECOR from September 1994 to December 1995. Since December 1995, has been the Chief of the Program for Production Systems and Transfer of Technology. Elected September 1996 as INRAN Scientific Director.

14. Mai Moussa Chetima -- Master of Science in irrigation from Utah State University. Returned to Niger in April 1993. Currently working at INRAN Departement Recherche Ecologique in Niamey.

15. Boukary Hama -- Master of Science in seed technology from Mississippi State University. Returned to Niger in June 1993. Worked at INRAN Departement Recherche Agricole. Returned to the United States in 1996 for Ph.D. training sponsored by the World Bank agricultural research support project.

16. Mahamadou Ibrahim -- Master of Science in seed technology from Mississippi State University. Returned to Niger in June 1993. Currently working at the INRAN research station in Maradi.

17. Issaka Mahamane -- Ph.D. in soil science from Purdue University. Returned to Niger in June 1993. Currently working as the Head of INRAN Departement Recherche Ecologique in Niamey. He is also the InterCRSP Coordinator for Niger. Was involved in the TROPSOIL and Peanut CRSPs.

18. Raphiou El Ibrahim -- Master of Science in agronomy from North Carolina State University. Returned to Niger in June 1993. Currently working at INRAN research station in Maradi.

19. Seyni Sirifi -- Bachelor of Science in agronomy from Purdue University in 1986, funded by the NCR Project. Master of Science in agronomy from the University of Nebraska. Returned to Niger in July 1993. Currently working at the INRAN Centre Regional de Recherche Agronomique (CERRA) in Kollo. Has been involved with the INTSORMIL activities and is still working with his principal advisor from University of Nebraska on fertilization and variety/density trials for sorghum and is starting work on cassava.

20. Ms. Seybou Kalilou Kadi -- Studied computer sciences at the Ecole Superieure d'Informatique in Cotonou, Benin. Returned to Niger in December 1993. Currently working at INRAN Direction des Affaires Administrative et Financieres in Niamey.

21. Chaibou Mahamane -- Diplome d'Ingenieur des Travaux in agricultural engineering from the Ecole Nationale des Travaux Publique in Ndjamena, Chad. Returned to Niger in January 1994. Currently working at the Office National des Amenagements Hydro-Agricoles and the IPDR in Kollo.

22. Adam Aboulaye -- Ph.D. degree in statistics from Iowa State University. Returned to Niger in August 1992. Worked as the Scientific Director of INRAN from 1993 to 1994. Resigned in August 1994 and joined WARDA. Currently resides in Bouake, Cote d'Ivoire.

23. Bio Maman -- Master of Science in statistics from Purdue University. Returned to Niger in February 1995. Worked for one year at INRAN/DSI and then returned to the United States where he currently resides.

24. Hassane Inoussa -- Diploma in computer programming from the Ecole Superieure d'Informatique in Cotonou, Benin. Returned to Niger in April 1995. Currently working at INRAN Division Statistique et Informatique in Niamey.

25. Issa Mahamane -- Docteur de 3eme Cycle in agricultural economics from the Institut Nationale Agricole in Tunis, Tunisia. Returned to Niger in June 1995. Currently working at INRAN DECOR in Maradi.

26. Abdoulaye Tahirou -- Master of Science in agricultural economics from Purdue University. Returned to Niger in October 1995. Presently working at INRAN Departement Recherche en Economie Rurale in Niamey. Was involved with the INTSORMIL activities.

27. Attikou Amadou -- Maitrise in soil science at the Universite Nationale du Benin in Cotonou, Benin. Returned to Niger in March 1996. Current posting is INRAN/DRE.

B. **Participants Still in Long-Term Training**

1. Hamidou Zeinabou -- Training for a Diplome d'Etudes Approfondies in soil chemistry and mineralogy at the University of Ouagadougou in Ouagadougou, Burkina Faso.

2. Issa Djariri -- Training at the Ecole de Medecine Veterinaire in Dakar, Senegal.

3. Karimou Moussa Moktar -- Training at the Ecole de Medecine Veterinaire in Dakar, Senegal.

4. Marou Zarafi Assane -- Training in agricultural economics at CIRES in Abidjan, Cote d'Ivoire.

5. Mohamadou Abdoulaye -- Training in sociology at the University of Cote d'Ivoire in Abidjan, Cote d'Ivoire.

6. Moussa Hamma Boureima -- Training for a License in sociology at the Universite Nationale du Benin in Cotonou, Benin.

7. Hame Abdou Kadi Kadi -- Training at Texas A&M University in College Station, Texas. Received support for three months job training and subsequently received assistantships for degree training.

8. Maman Nouri -- Training at the University of Nebraska. Received support for three months job training and subsequently received assistantships for degree training.

9. Moussa Goube Gaoh -- Ph.D. in soil science at Texas A&M University. Still in training in the United States.

10. Kedidia Mossi -- Started Bachelor of Science in plant physiology at the University of Nebraska but terminated studies early. Has now returned to University of Nebraska on a self-financed program.

C. Short-Term Training Opportunities Provided Since May 1992

Name	Training Site	Date	Current Duty Station
Adamou Hima S.	EURELEC Casablanca	6/25/93	CERRA/Kollo
Basso Adamou	Complexe d'Agadir	2/28/93	CERRA/Kollo
Boukari Issaka	EIER Ouagadougou	10/6/92	Direction d'Agriculture/Diffa
Chegou Maman	United States	7/31/92	CERRA/Diffa
Louise Gondja	Burkina Faso	9/30/95	INRAN/Niamey
Dade Haya T.	EURELEC Morocco	2/10/93	Attending other training in Benin
Djermakoye Bibata	University of Pittsburgh and CESAG Dakar	07/31/92 6/16/95	INRAN/DG/Niamey
Doudou Yacouba	EIER Ouagadougou	10/16 92	Unknown
Garba Kano Sanoussi	EURELEC Morocco	6/25/93	CERRA/Maradi
Garba Issaka	EURELEC Morocco	2/10/93	CERRA/Maradi
Hamidou Zeinabou	Burkina Faso	9/30/95	CERRA/Niamey*
Haougui Adamou	Morocco	3/6/93	CERRA/Kollo*
Ibro Germaine	Purdue University and Senegal	6/3/93 3/4/94	CERRA/Niamey
Iddi Ousmane	EURELEC Morocco	6/3/93	CERRA/Niamey*
Idrissa Mounkaila	Senegal	7/3/93	CERRA/Niamey
Iro Sani	CEAG Dakar	6/16/95	INRAN/DG/Génie Civil
Issa Aboubakar	Burkina Faso	1/25/93	CILSS/Ouagadougou
Kaka Saley	Purdue University	11/06/95	CERRA/Niamey
K. M. Moctar	Alabama A&M University	9/2/95	CERRA/Kollo*
Seydou Ramatou B.	Purdue University	11/6/95	CERRA/Niamey
M. A. Mahamadou	Senegal	3/4/94	CERRA/Maradi
Maliki Aissata M.	IPD/AOS Ouagadougou	6/30/93	CERRA/Niamey
Mamadou Hassane	Burkina Faso	1/25/93	Code Rural/Niamey
M. H. Zarafi	Senegal	3/4/94	CERRA/Maradi*
M. Abdoulaye	Senegal	7/31/92	CERRA/Niamey*
O. A. Idrissa	Senegal	7/3/93	PDRT/Tahoua
Oumarou Issa A.	Centre National d'Agronomie	6/30/93	Unknown
Sadi Aichatou	Burkina Faso	9/30/95	CERRA/Niamey
Saley Boukary	United States	9/30/95	Unknown
Souley Chipkaou	United States	9/30/92	Unknown
Traore Nassouba	Burkina Faso	9/30/95	CERRA/Kollo
Hamani Inoussa	ESIG Morocco	6/30/92	CERRA/Niamey
Hadiza Gabey	United States	8/29/94	CERRA/Niamey

*Participant is currently in training.

FIELD TRIP REPORT

Dr. Moussa Adamou

From 8 to 10 September 1996, I made a trip to Maradi to interview former students who had studied with NAAR Project scholarships. Dr. J.T. Russell, team leader, organized the trip. The itinerary was:

Depart from Kollo -- 8 September
Stay in Maradi -- 9 September
Depart from Maradi -- 10 September
Stay in Birin-Konni for three hours -- 10 September
Return to Kollo -- 10 September

In Maradi, interviews were held with four students. One of them (Cherif Ari) did not benefit from a NAAR Project scholarship, but did finish his M.S. degree at Purdue University in December 1987. The three other students were:

- Diallo Soumana Amadou, M.S. from the University of Arizona in Tucson. He returned to Niger in July 1990 with a degree in soil and water engineering and presently works in Maradi on soil management.

- Mahamadou Ibrahim, M.S. from Mississippi State University. He returned to Niger in June 1993 with a degree in seed technology and plant breeding. He currently works in Maradi on conservation and characterization of plant genetic materials.

- Issa Mahamane, Doctorate 3eme Cycle from the Institut Nationale Agricole in Tunisia. He returned to Niger in August 1995 and presently works in Maradi on millet/peanut cropping schemes and agro-economic surveys.

I could not meet with Sabiou Mahaman because he is posted in Diffa, which is located more than 700 kilometers east of Maradi.

All of the students who studied in the United States were happy with the education they received. The professors were friendly. However, the people who studied in the United States and are currently working in Niger do not believe they have a proper environment in which to work. They lack suitable materials, but all are working in research.

Issa Mahamane, who studied in Tunisia, said he did not appreciate the fact that he had to spend three months in Tunisia with a scholarship. He deplored the difficulties AID had in making financial arrangements for his studies. He also felt that he received mainly theoretical training in Tunisia.

Concerning InterCRSP activities in Maradi and Birin-Konni, a peanut fertilization trial is being conducted on farmers' fields in the Konni area. Another trial on calcium efficiency in peanut varieties is being conducted at the research station in Maradi. Finally, the InterCRSP is engaged in production of hybrid seed in Maradi. All experimental fields visited in Maradi and Birin-Konni were in good shape.

NAAR PROJECT ACTIVITIES AT INRAN SINCE JUNE 1990

I. Technologies Developed

NAAR Project activities in this area centered on improving millet, sorghum, cowpea, and peanut varieties; soil fertility improvement; and transfer to the farmer level of newly developed technologies.

A. Crop Improvement

The objectives of these studies were to develop new performance technologies -- varieties and cultural practices -- that increase crop production and are easily adopted by farmers. From 1990 to 1992, selections conducted by the INRAN researcher on sorghum helped develop and confirm the performance of two pure lines (Sepon 82 and SRN-39) and one hybrid (NAD-1). Sepon 82 is a selection from Purdue materials. It is a high-yielding variety with good grain quality and early maturity. SRN-39 is a Striga resistant variety with good grain quality. NAD-1 is a very high-yielding hybrid with good grain quality and is adapted to a range of growing environments.

B. Improved Cropping Systems

Work has been carried out on cropping systems for millet, cowpeas, and sorghum in pure stands and in intercropping. For millet and cowpeas, the results obtained have been positive because they permitted the development of a cowpea sowing machine that is 500 percent more efficient than hand planting. It has also been shown that the cowpea variety TN 5-78 is an improved variety with higher yields in both pure stands and in intercropping, especially with dwarf type millet. But the high-yield dwarf type millet has still not been distributed to farmers. It has also been recommended that farmers increase the density of cowpeas in the improved system of millet/cowpea intercropping.

After 3 years of research in intercropping with millet and cowpeas, it has been demonstrated that the system of continuous cropping of cowpeas in pure stands considerably changes the ratio of carbon to nitrogen in the soil for the better and that the yields of cowpeas are higher than in the traditional system of intercropping millet and cowpeas.

For millet and sorghum in an intercropping system, a series of millet/sorghum technologies has been developed for the Soudanian Zone near Gaya. Nitrogen use in this type of intercropping has resulted in yield increases of up to 60 percent. The grain yields in sorghum have also increased by 50 percent with increasing plant densities.

Millet/cowpea intercropping and cowpeas in pure stands have been proven to have favorable effects on soil fertility and on the productivity of both species in trials.

C. Irrigation Systems

Ray Norman and Soumana A. Diallo evaluated the performance of water lifting methods at the Maradi station. A simple discharge-lift function was developed and performances envelopes and operational ranges were established for manual and animal traction lifting systems. The characterization of these methods should facilitate an accurate selection and evaluation process for appropriate water lifting technologies used in small-scale irrigation development in the region.

II. The Contribution to Research Output and Institutional Development of INRAN

During the NAAR Project, the research/extension liaison unit should have worked to facilitate relations between research and extension. Due to the lack of a counterpart for the technical assistant, the unit could not function properly. The relations between INRAN and the extension service are still not well established. The technical assistant in the NAAR Project spent months at INRAN trying to organize a better relationship between the Liaison Unit and DECOR with no success. Since the Liaison Unit and the INRAN documentation center are both concerned with improving communications, their relationships were better established.

In the area of communications, even though the working group was not established, an evaluation process for new technologies at INRAN was initiated, especially for sorghum, millet, and cowpeas. For dissemination of technical information, the Liaison Unit developed technical bulletins with researchers.

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