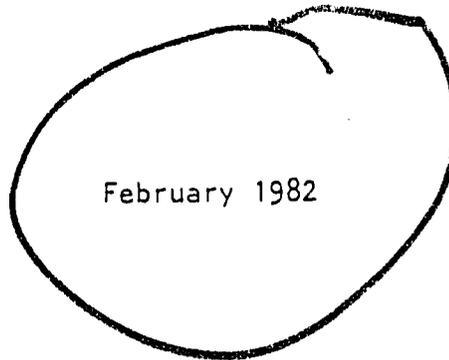


EVALUATION OF LUTHERAN WORLD RELIEF PROJECTS

NIGER



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## I. INTRODUCTION

### PREFACE

This document is the product of an evaluation carried out in Niger by Fred R. Weber, forester and engineer, and Marilyn Hoskins, anthropologist, under a contract between Lutheran World Relief (LWR) and Virginia Polytechnic Institute and State University (VPI & SU). It was designed to give the New York office of L.W.R. an end of project report on several completed activities, feedback monitoring on several ongoing activities, and an analysis of effectiveness and impact of LWR policies in relation to the Niger program. The team was to give an objective report from their respective technical and social sciences perspectives grounded in extensive experience in Niger. Team members were in Niger from February 8 to February 28, 1982. They read project documents, reports and correspondence, spoke with LWR and Government of Niger (GON) officials and agents of technical services, with Nigerien and LWR project managers, and with Nigerien farmers, herders, and villagers, both those involved and those not involved in LWR projects. The terms of reference and a map showing the itinerary and project sites are in Annex A.

## EXECUTIVE SUMMARY

In response to widespread drought related famine, LWR started operations in Niger in 1975 with a well digging program. Thanks to a series of unusually dedicated and able field representatives and staff, the program expanded steadily along the local priorities of increasing water and food availability on an ecologically sound and sustainable basis.

Today LWR has 13 separate activities, eight of which were the subject of a special evaluation carried out by Marilyn Hoskins and Fred Weber in cooperation with LWR field staff and GON agency personnel. The combined budget of these eight projects is \$1,120,000 and the activities are 52% complete. A summary of these efforts shows that:

- the eight projects produced encouraging results. From an overall perspective, their solid and consistent accomplishments are among the most meaningful and effective of any of the development activities in the entire country.
- impacts are specific: more food and water, the overriding priority in Niger.
- in general, activities are directly applied to the grass root farmer-herder level (two infrastructure projects are the exception).
- LWR's response capability providing funds and project development staff has been rapid and efficient. Favorable comments on this were received at several locations from GON agents as well as local people.

- the cost effectiveness of LWR's (8 projects) operation is ~~high~~: approximately \$580,000 were spent during the last 3 years which resulted in 325 wells, 170 ha of irrigated gardens (estimated total production: 700 tons of vegetables) plus numerous secondary outputs in road construction, buildings, livefencing, establishing educational and health delivery systems, and enhancing host country project management capability. Approximately 13,000 people have directly benefited through improved water supply or increased food production or both (at the average cost of about \$44.00 per person).
- in terms of bilateral economic assistance, a \$500,000 project appears almost insignificant. However, in terms of comparable outputs achieved and rural people effectively assisted, these facts and figures are impressive. (See chart)

	OUTPUTS			SPENT TO DATE 000 \$	PEOPLE DIRECTLY BENEFITING
	WELLS	GARDENS	OTHER		
Filingue Wells	67 wells (non-garden)	-----		85	3400
Damana Gardens	120 garden wells	15 ha	metal fencing nursery installation some livefencing extension	92	1200
Them Gaigorou		8 ha 8 ha	1 building, some livefencing	58	320 <sup>o)</sup> 320
Telemces	7 village wells 14 herder wells 37 garden wells	75 ha	midwives, livefencing literacy training, extension, road constr. animation	150	5000
Tanguechmane	2 garden wells	12 ha	animal water lifting basic health education basic animal health care	10 <sup>x)</sup>	420
Tahoua Fruit Tree Nursery		4 ha	livefencing-windbreak, agricultural extension, pilot nurseries	55	n.a. infrastructure projec (5000) <sup>x</sup>
Tahoua Gardens	78 garden wells	40 ha	rural animation, cooperative movement	102	2500
Gaya	n.a.	n.a.		24	infrastructure projec (appr. 500) <sup>x</sup>
	325	162 ha		576	13160 (5500) <sup>x</sup>

x) 5000 \$ Embassy self-help  
approx. 5000 LWR "pre-financing"

o) once dam is re-built (GON project)

x indirect benefits only

SUMMARY OF PROJECTS

The program is now sufficiently well advanced to allow the following projections:

- Replicability: Based on expanding local interest and awareness, shallow concrete lined wells and vegetable gardening can be introduced into other areas. Techniques appear to be cost effective, increased numbers of skilled well technicians are available, making further reduction of development costs possible.
- Spin offs: (1) Project activities apparently have encouraged gardening efforts also among people not directly benefitting from specific project inputs. (2) There has been a noticeable increase in supply of fresh vegetables in traditional village as well as regional markets. (3) A number of host country technical agents have received a substantial boost in terms of logistic and material support to enable them to more effectively initiate other local programs. (4) Projects have stabilized settlements through more effective use of available land and water, thus decreasing rural exodus. (Perhaps as many as 500 people remained to work in rural areas as a result of these projects).
- Continuation after project inputs have ceased: Gardeners who are established, can carry on without further grant assistance. For well construction to continue, however, it will have to be institutionalized. A private well construction system also appears to be feasible. Properly assisted, future private sector activities in well construction appear promising.

The summary recommendations of the evaluation are:

- Stay with projects that focus on providing more water and food.
- Select six major project clusters and concentrate resources there.
- Carry each project until enough "progress" has been made for it to continue without further assistance.
  
- Avoid assisting one group at the expense of another.
- Staff personnel should spend more time in the field.
- Tighter financial control and project administration are necessary.
- Develop a more effective livefence maintenance and exploitation formula.

## PROJECT FACE SHEETS

## Title:

PAF II (Filingue Wells and Watering Troughs)

## Dates:

Phase I - 1979-1981

Phase II - 1982-1984

## LWR Budget:\*

Phase I - \$58,800

Phase II - \$135,000

## Participants:

GON: Animation Service (lead agency)

Local Participation: Villagers provided labor for constructing 50 wells and 132 watering troughs. In phase II, villagers of 57 villages are expected to provide labor for 100 wells and up to 300 troughs and to load gravel and sand on project truck.

## Activities:

Mobilizing villagers to improve water use systems for domestic and animal use.

## Status:

Agreement signed December 1981

## Recommendations:

Continue project

\* All budgets calculated at 250 CFA/\$1.00

**Title:**

Damana Garden Project

**Dates:**

October 1979 - March 1981

**LWR Budget:**

s92,000

**Participants:**

GON: Agriculture Service Lead Agency  
Local: Loaded sand and gravel on project truck, labor for wells.  
Other: Collaboration with CARE which works in similar activities.

**Activities:**

Gardens, 120 wells, access to seed and fruit trees, manioc nursery in Borgho, live fencing.

**Status:**

Project completed September, 1981

**Recommendations:**

Additional inputs not warranted at this time

## Title:

Tillabery Mares (Seasonal Lakes)

## Dates:

June 1978 - June 1980

## LWR Budget:

s58,236

## Participants:

GON: Agricultural (Lead Agency) and Cooperative Services  
Local: Villagers of Them and Gaigorou  
Other: UNICEF established school garden

## Activities:

Recession gardening supplemented with irrigation from two wells. Imported wire fencing to be replaced by live fencing, new varieties and improved seed introduced. Establish production based cooperative.

## Status:

Project completed June, 1980. Second phase request submitted but not through GON process.

## Recommendations:

Refrain from further inputs until formal host country request is received. Then review and if decide to support, focus on subsistence production with related social efforts (women's participation, home consumption) and comprehensive resource planning.

## Title:

Telemces

## Dates:

Phase I - 1979-1981

Phase II - 1982-1984

## LWR Budget:

Phase I - \$123,000

Phase II - \$353,000

## Participants:

GON: Phase I - Agricultural (lead agency), Literacy, Health, Water and Forestry Services.

Phase II - All above plus Cooperative Service and Rural Animation.

Local: Phase I - Participation from six villages: Telemces, Anekar, Gaouey, Gambane, Taza, Innadagoum. Villagers and gardeners provide sand, gravel and labor for garden and village wells.

Phase II - Construction of herder wells organized by Animation in which herder participation is expected. Continuation of Phase I.

## Activities:

Phase I - wells/irrigation/gardening; adult literacy; windbreaks/live fencing; public health, road improvement

Phase II - includes continuing above plus herder wells, cooperative service with agriculture establishing revolving fund for seed, fertilizers, and insecticides.

## Status:

Phase I completed. Agreement not yet signed for Phase II

## Recommendations:

Sign agreement and continue with Phase II. Emphasize general resource development plan.

Title:

Tanguechmane Mares

Dates:

No agreement yet

Proposed LWR Budget:

Request for \$132,000

Proposed Participants:

GON: Agriculture Service (lead agency), Water and Forestry,  
Literacy, Animal Husbandry, Health, Animation,  
Cooperatives.

Other: US Self Help fund has given \$4,900 for seeds, fencing,  
fertilizer and insecticides

Local: Participation expected

Proposed Activities:

Project idea has been advanced through GON formalities to LWR/Niger for  
transmittal to LWR/NY for financing

Recommendations:

Reduce prefinanced inputs to minimum until satisfactory agreement is  
signed. Concentrate on natural land and resources development with  
accent on individual family food production and water

## Title:

Tahoua Fruit Tree Nursery

## Dates:

1981-1983

## LWR Budget:

\$111,000

## Participation:

GON: Agriculture (lead services), Water and Forestry, Rural  
Engineering, Animation Services  
Local: Land expropriated from farmers

## Activities:

Phase I - Installation of 4 ha nursery including construction of housing and irrigation pump and distribution system. Production of fruit trees.  
Phase II - Continuation of nursery, extension training, distribution of trees and establishing outlying village nurseries.

## Status:

Beginning of 3 year project

## Recommendations:

Continue support stressing social sensitivity, more cost-efficient use of imported commodities and increased use of local materials.

Title:

Lahoua Gardens

Dates:

December 1980 - April 1983

LWR Budget:

\$146,000

Participation:

GON: Agriculture Service (lead agency), Water and Forestry, Animation and Cooperative Services  
Local: Sand and gravel and labor for 300 wells.

Activities:

Wells/gardens, live fencing, demonstration gardens, formation of mutual groups (pre-cooperatives)

Status:

Official project document of October 1980 signed March 1981 due to communication delay - LWR/NY

Recommendations:

Continue project activities. Reanalyze priority garden well sites in view of apparent social discrepancies complicated by varying ground water tables and well digging difficulties. Overall development plan is urgently needed.

## Title:

Gaya Agro-Forestry (Gouroubassounga Forest)

## Dates:

November 1979 - November 1982

## LWR Budget:

\$24,000

## Participants:

GON: Forest Service (Lead Agency)  
 AID: FLUP Model Site no. 3. Technical assistance, materials,  
 and equipment.  
 Peace Corps: one volunteer  
 Local: 60 farming families

## Activities:

Financing nursery and planting efforts for agro-forestry: raising food trees in conjunction with dry land farming inside a forest reserve.

## Status:

One planting season remains - previous efforts impaired by fire and animal damage.

## Recommendations:

Continue efforts through next planting season as planned. Possible extension entirely dependent upon Forest Service ability to develop formula for involving residents in successful tree protection and maintenance.

## II. COUNTRY PROGRAM

### PROGRAM HISTORY AND DEVELOPMENT

The LWR program in Niger grew out of a series of short and medium term efforts aimed at providing immediate drought relief assistance. In their search for incisive, specific, and first-order assistance to drought victims, the LWR field staff identified a number of projects all focusing on providing more water and foods in the Sahel regions of Niger where needs were the greatest.

In 1976 the major effort began to focus on concrete lined wells for irrigated gardening as an intermediate technology between hand dug traditional wells lined with the local species Combretum micranthum or other local material, and the expensive large diameter "open dug" wells put in by the GON water authority. The LWR technology, suitable for shallow wells in loose substrata, was made available to communities through training locally selected villagers as wells technicians and by offering materials and equipment to communities who provided sand, gravel and labor. During the following years LWR activities diversified into support for irrigated dry season vegetable gardening, recession gardening (planting along edges of mares or seasonal lakes as the water recedes) and related community development activities.

In Niger, private voluntary organization (PVO) activity is carefully controlled by the Nigerien government. The GON works with outside

organizations only when the efforts focus on governmental priorities and when activities are coordinated with or by Nigerien governmental service agencies. The Nigerien government in its five year plan (as well as USAID in its strategy plan - CDSS) has identified increasing availability of water and of food as the first and second priority for projects in Niger.

Of 13 activities LWR is presently funding in Niger, four selected by LWR/NY were judged to be sufficiently mature and of sufficient size to be evaluated in depth. Four additional projects were selected by LWR/NY for review.

Six of these eight projects are wells and gardening activities supplemented by forestry, health, literacy, animation (community development) and agriculture extension components intended to strengthen the overall well/gardening project impact. Forestry efforts offer gardeners windbreaks and live hedges. Literacy focuses on gardening information, weight and measures (for selling vegetables) and numeracy. Animation agents inform people about the program and help them organize to participate. Health inputs provide medical supplies to local health workers and information on nutritious use of newly introduced vegetables especially as weaning foods.

The other two are infrastructure projects.

## OBJECTIVES

As the program developed, LWR adopted various general objectives to be used as criteria for assistance. AID matching grant objectives were added to the list until there are currently fifteen guideline points which various project designs are trying to fulfill. Additional criteria have been incorporated as they became available (ecologic mini-guidelines by CODEL). Individual project activities clearly can not meet equally well all of these objectives at the same time.

These various requirements were analyzed and relative values established to indicate how well the objectives were met by individual project efforts. The results are shown in the following table for the 8 selected country projects.

The different columns represent essentially the various aspects that the evaluators were to follow as outlined in their scope of work. Columns 1 to 9 are based on LWR's general strategy guidelines and the desire to know how well individual projects were followed through by LWR/Niger field staff. Columns 10-12 represent the objectives outlined in the matching grant, 13-15 cover issues to be addressed by the evaluation, and columns 16 and 17 were added by the evaluators in an attempt to summarize significant and intrinsic values. Columns 19-24 represent the basic "parameters" to be considered in assessing ecologic impacts of specific project activities in line with CODEL's ecologic mini-guidelines.

Low (L), Medium (M) and High (H) values were assigned across the table for the various projects and O indicated no impact or not applicable.

	LWR OBJECTIVES								MATCHING GRANT OBJECTIVE	SOW	OTHER	Environmental impacts per "mini-guidelines"											
	Idea originate with target group	Serve poorest majority	Stimulation of local and national organizations	Accent on local, natural and human resources	How well can activities become self-supporting?	Technical soundness	How much is project part of overall program?	Periodic review & evaluation by LWR	Stimulate communities own development	Support infrastructure network	Assist government project management capability	Adequacy of LWR staff support	Applicability of credit-financing	How replicable are project efforts?	Significance of effort (size, number of people involved, etc.)	Priority in term of local needs, perceived values, urgency, etc.)	Physical environment-soil, water, natural vegetation	Health	Economics (local)	Socio-political factors (stability)	Cultural	Administration, government agencies	Energy
	1	2/3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Filingue wells	H	H	L	M	M	H	H	M	M	M	L	M	L	H	H	H	L	H	H	H	0	L	0
Damana gardens	M	L	M	H	M	M	H	L	L	L	L	L	L	L	M	M	0	H	0	0	0	L	0
Tillaberi mares Them	M	M	H	H	H	M	H	L	H	M	M	L	L	M	L	H	H	0	0	H	0	0	0
Gaigorou	M	L	H	H	H	M	H	L	M	M	M	L	M	M	L	M	H	0	0	0	0	0	0
Tanguechmane	H	H	H	H	H	H	H	-	H	M	H	M	L	H	M	H	H	H	H	H	H	0	0
Telemces	H	H	H	H	H	H	H	H	H	M	H	M	M	H	H	H	H	H	H	H	H	0	0
Tahoua fruit tree nursery	L	M	M	M	H	M	H	H	M	H	M	L	H	L	H	M	0	H	0	0	0	L	L
Tahoua gardens	M	M	H	H	H	H	H	M	H	M	L	M	H	H	H	H	H	0	0	H	H	0	0
Gaya	L	L	M	M	M	M	M	L	L	H	L	L	M	M	L	L	H	0	0	0	0	L	0

CHART: PROJECT PERFORMANCE BY INDIVIDUAL OBJECTIVES

## 1. Project Ideas Must Originate With Target Group

"Project ideas must accommodate social customs. They must be in line with cultural values and reflect the felt needs of the people and be in harmony with overall government plans".

Most of the ideas for the projects in Niger were based on extensive up-country trips by LWR personnel who visited the various sites. The ideas and desires most frequently and most spontaneously advanced by area residents were, and still are:

- A. More water: permanent wells deep enough to provide water year round.
- B. Assistance to establish and develop larger, more permanent garden plots. Requests often focus on relatively modern and expensive commodities such as metal fencing, chemical fertilizers, etc.
- C. A high priority is given by people to fruit trees. They would like to grow mangoes, citrus and other fruit often in areas so dry that extensive permanent irrigation and considerable protection against animals would be required.

These basic requests expressed by local pastoralists and farmers are completely in line with government priorities; food and water. The GON five year plan, as well as donor governments', Club and CILSS strategies all agree on this point. LWR's major thrust on water (wells) and food (winter vegetable and fruit gardens) is very much in line with these identified priorities. In a country like Niger where everything can easily be construed as priority, a donor must focus on and adhere to the most basic issues in spite of continuous pressures and temptations to be sidetracked into other activities which are also "very urgently needed".

## 2. Project Should Serve the Poorest Majority

Providing food and water through gardening and wells addresses this criteria. The situation in Niger, especially in view of development since the last drought, and particularly in the two to five hundred millimeter rainfall zone, follows a set pattern of needs. The needs level encountered determines the appropriateness of the response.

### Level I

Extreme shortage of water and forage forces pastoralists to retreat to and concentrate around very few bore hole wells or permanent lakes. After they have lost their animals, they gather around food relief distribution points.

The type of assistance that is required here is food distribution, basic medical assistance, social service assistance, etc. The accent is on the survival of individuals. This essentially is a disaster relief situation where the recipients consume inputs and produce nothing.

### Level II

An analysis of the natural resources is made; basic plans to develop and manage the remaining available soils, water, and natural vegetation follow. Resettlement of individual families and small population groups is priority.

The type of assistance here focuses on water development, basic food production with the priority on calories, protein, then vitamins and minerals. This logically leads to well water schemes as well as irrigated dry season vegetable and fruit tree gardening. Subsistence activities

are started with the accent on reestablishing basic food and water production by and for individual families. All that is produced at this level is consumed directly by the individual family units.

### Level III

With basic family production units now functioning, the first communal activities can take place; community planning, group and communal problem identification and resolution in relation to education, economics, health, etc.

Assistance shifts to communal resource development planning, buying, marketing, basic income generation, agricultural extension, literacy training and the establishment of basic health delivery systems.

The accent switches from individual families to helping take advantage of other families' presence. Different abilities, skills and motivation provide the first basis of communal interaction between respective families which are now slowly reaching a basic market economy level.

How well under these circumstances, the poorest of the project population are served, how well the nature of grass-root problems are addressed, depends upon the level of the target group. Once this level is determined, the appropriate type of assistance can be identified and selected. The levels in these areas may fluctuate from year to year, depending on the abundance of the rains of the previous season.

Given the precarious nature of rainfall, assistance must be extremely flexible. Whereas community development and basic market economic needs can be stressed after several good seasons, a few years of little or no rain may force the people back to a subsistence if not survival level and the type of assistance must be adjusted.

### 3. Political, Social and Economic Implications

"All economic, social and political factors must be considered, including the consequences of success, the effect on the environment, and the potentiality for the activities to continue".

- A. LWR's involvement in vegetable gardening in many areas has legitimized activities that individuals and families had undertaken on their own. The presence of a donor has given strength to the movement and helped farm families establish themselves on sites that originally were open to common grazing or free access to animal water sources.
- B. We were constantly told how these gardening efforts were helping to prevent an exodus of local people who would otherwise have been forced to go great distances to look for additional employment. The socially favorable implications of these activities cannot be overstressed since the assistance provided also helped individual families stay together. Government agencies recognize the importance of this and very much appreciate the inputs that help stem one of the most serious social problems in this marginal environment.
- C. Environmental effects are on balance positive. The only negative impacts cover issues such as use foregone and concentration.

The more successful gardening is, the more access of grazing animals to water will be restricted. This could eventually lead to

conflicts between gardeners and pastoralists. Proper planning and placing reasonable limits on expansion will greatly mitigate these kind of problems.

Any time ground water is developed in the form of more permanent and higher yielding wells, and animals will concentrate around these watering points. Experience elsewhere has shown that concentration can rapidly destroy the surrounding natural vegetation. The LWR wells mitigate these adverse affects by constructing many small, low-yielding wells that are dispersed throughout the country rather than concentrating on few locations with high yield outputs of water. Dispersal helps reduce concentration to keep it on a tolerable level as far as the surrounding environment is concerned.

Drought cycles in this part of the world will certainly repeat themselves. How much will project activities affect the situation during the next drought? Keeping development activities small and dispersed, and focusing on providing adequate water in small quantities at many places will certainly reduce some of the adverse effects observed during the last drought. Small dispersed improvements will spread the risk among different locations and keep concentration of population and animals within lower limits. If ground water resources hold out, people at least will have enough water for their own consumption and to raise some basic staple food in their gardens. Even if surface water resources fail,

ground water tapped by these wells will help carry over basic herd units as well as the people themselves.

#### 4. Stimulate the Development of National and Local Organizational Structures

How much such a program helps develop national structures is questionable. Presently there are so many donor activities covering Niger that host country agencies are hard pressed to provide the basic coverage necessary to keep things running smoothly. Available manpower in all of these agencies is strained to the limits. Annual output of new technicians through the education system is still limited. Motivation of these agents is hindered by an archaic service incentive system. It is doubtful whether more assistance from the outside can provide much relief along these lines. Government agencies have limited absorption capabilities and how to effectively enlarge and enhance their capacity is a problem all donors, including the private voluntary agencies, are facing. The best LWR can do is to:

- a) carefully identify among the various government agents those that have above average motivation skills and are willing to do their share.
- b) concentrate in those areas where there are few projects demanding government field agent's time and resources. (Prime example: Tanguetchmane)

As far as developing local structures are concerned, the biggest issue is local participation. The evaluation has shown several interesting points along these lines:

- A. No help can and should be expected on the part of pastoralists to provide free labor in connection with public animal wells.
- B. On the other hand, it is quite reasonable to expect local farmers to provide sand, gravel, and labor for individual garden wells.
- C. Construction of community wells is somewhere in between. Some help can be expected from families living nearby that will profit from these wells but it must be kept in mind that since these are "public" and anybody can eventually come to get water, individuals may be reluctant to contribute.

Local organization may profit in many other ways from these project activities. As pointed out above, however, much depends on the level of development. In those areas where a basic local marketing system exists, the project certainly can help communities organize to undertake basic food production and marketing.

Another interesting aspect is the availability of individual well diggers. A number of adequately trained technicians are now available to construct wells on a private profitmaking basis. Although this does not directly help development of a local community structure, the fact that efficient private well digging services could be available, is of considerable importance to planning future local community efforts.

##### 5. Indigenous Human and Material Resources

Basically all project activities are labor intensive and provide a training element either in construction (well digging) or in agriculture (vegetable and fruit production). In due time, local people can assume administrative and technical responsibilities of the various project efforts themselves.

Most project efforts are keyed to the use of local materials. Where machine technology is required (Tahoua fruit tree nursery), host country agencies and, to a lesser extent the local people, have tended to ask for relatively costly foreign equipment and materials. LWR staff has generally been successful in keeping unnecessary capital intensive inputs to a minimum. The staff should be encouraged to continue to stress the need for local materials and human resources, although this may not appear to be a "modern" approach to some.

#### 6. Self Supporting

Starting projects has required some outside input. This raises the danger of providing free supplies to which people become accustomed. The changeover to local self support is delicate. However, good vegetable yields in the garden and quality and quantity of water available in the new wells, appear to have encouraged local residents to take more initiative themselves.

Project activities, particularly in the case of vegetable gardening, have already become a way of life for a number of families. As success multiplies, the participants must increasingly take management responsibilities into their own hands. Financing can be shifted gradually to the individual participants. However, it must be pointed out that many of the people who started vegetable gardening under this project, would have had absolutely no resources at their disposal with which to begin, without project support.

## 7. Technical Soundness

The wells, as they are constructed at present, provide a good compromise between low cost, locally applicable techniques and basic minimums required to provide reasonably long lasting wells with water of adequate quantity and quality. As indicated in the technical annex, some improvements are necessary, especially in regard to aquifer penetration and super structure improvement.

Irrigation gardening is successful and feasible. Additional improvements could be made in waterlifting, installation of pipe systems as well as seed production and development.

The forestry and conservation component also has proven quite feasible. Live fencing utilizing indigenous species is possible and within the capabilities of the local people. The biggest problem here is proper enforcement and maintenance of these fences and their rational exploitation.

## 8. Integration Into Comprehensive Programs

Ongoing project activities are supervised and handled through local development committees operating under the auspices of government administrators. This process provides the potential for proper integration.

Additional emphasis should be placed on the following points: analyze at the onset relevant needs and constraints of the local people; insure comprehensiveness and significant permanent improvement of the local people's living standards; and, cooperate and coordinate with other donor and implementing agencies so that projects are mutually reinforcing and will avoid critical omissions or duplications. What is badly needed is overall development- or use plans in areas where vegetable gardening efforts are taking place. (See technical annex for more details).

## 9. Periodic Review and Evaluation

LWR project staff as well as most host country agents involved in these projects are all new. There are relatively few records of project history. Periodic reviews and situation analyses are needed to tighten up project performance as well as to give new personnel a better insight into project development dynamics. Mistakes have been made that can be avoided and corrected only if they have been recorded. Six month situation summaries may provide the necessary benchmarks for the future.

## 10. Stimulate Communities' Own Development (Matching Grant)

Some of the projects efforts have had positive results in community self-development (Tahoua gardens). In several of the gardening areas such as Telemces, gardeners are beginning to work together under the guidance of government agents. This collaboration is also beginning at Tanguetchmane.

Whether this is an appropriate criteria, as discussed earlier, remains a question of the "level" of development.

Providing wells to nomad pastoralists obviously does not contribute directly to any form of community development. These are family groups, not "communities".

In Borgo, project activities have been taken over by the local agricultural agent and the population's interests have been relegated to a passive role.

In general, the communities' input in defining the various projects analysed is best described as, at the same time compelling and passive. Certainly the efforts in Filingue (wells), Damana, Tillabery mares, Telemces

and Tanguetchmane (gardens) were a direct response to obvious needs of people, who - at that time - still had hardly recovered from the devastating effects of a major drought. The needs for more food and water were evident to even the most casual observer. Based on these urgent and general needs, the GON did everything they could to appeal to anyone on the outside for help. Many of the larger donors responded with massive "integrated rural development" schemes while smaller donors zeroed in on more specific projects limited to particular villages or smaller sites.

LWR chose, for very sound reasons, to concentrate as directly as possible on wells and gardens. In addition, the LWR staff focused on areas particularly hard hit by the drought, the drier portions of Niger where recovery was slowest and good rains - even after the drought was over - did not materialize. A perfect case in Tanguetchmane where last year's rains, again, were not sufficient to produce any staples.

The future of these efforts, beyond LWR's involvement, is difficult to foresee. Encouraging signs point to continuation and even a possible expansion of activities: additional well digging certainly is possible thanks to a simple and relatively cheap technique as well as the availability of sufficient local technicians trained who are perfectly able to do the job without further outside help, provided the basic costs are covered. Many examples exist where neighboring gardeners, though not directly involved in project activities, have begun to expand their operation and include some of the techniques and seeds that - thanks to LWR funding assistance - were introduced into the general area.

The community's role on ability to meet basic human needs was one of support and open-arm-welcome to efforts designed to provide more food and water. Within their limits, people responded, actively in some cases. Sand and gravel as well as free labor was provided in connection with most of the garden wells. In other cases (construction of public wells, for instance), spontaneous self-help participation was not that forthcoming. Pastoralists apparently have only a limited commitment to assist in efforts that eventually will serve others as well.

The basic needs in terms of available food production and drinking water were met by project efforts. How completely and how effectively is a matter of considerable judgement. One can quickly point out that 1 meter of a "Lutheran well" costs only a fraction of what the quasi-government agency is charging for theirs. The difference, however, is that "theirs" are a lot deeper in most cases and contain an inner ring that penetrates 3 to 4 meters into the aquifer. Or, a gardening effort can be cited where 100 kg of onions which were subsequently sold for the equivalent of \$45.00 were grown on a surface as small as 4 square meters. But, are raising onions going to Nigeria addressing "basic human needs"? In Tangueman to take another example, potatoes soon will be harvested which people have never tasted before. Will the local people even touch them? They say "yes" and back up their answer with the argument that at present there is nothing to eat in the village and their women have to go 40 km on donkey-back to collect wild, bitter tasting lilly bulbs.

Under these circumstances, the question if basic needs were met can be answered by a resounding YES. Not that future efforts could not be more

cost effective. But compared to other efforts designed to meet basic human needs, our carefully considered opinion is that these wells and water projects are some of the best and most effective in the entire country, bar none.

As far as the environment is concerned, the projects on the whole have a positive impact. Disturbance and concentration effects are kept at a minimum; the smallness of the individual efforts are an asset in this respect. Natural resources are used efficiently and positive effects are added by the improvement of micro-climate (live-hedges and windbreaks), provision of more complete ground-cover, improvement in sociologic and economic terms without liquidating or over-using natural resources which still exist.

The communities have not developed other projects as the result of working together in LWR activities. However, in the case of garden expansion, project participants as well as some of their neighbors have enlarged their own areas, are putting in new gardens, or are raising other new crops. In the case of public wells that were installed, we are not aware of families or individuals who decided - inspired by what they had seen - undertook a public well themselves. In spite of the fact this type of well is relatively inexpensive to construct, it nevertheless takes cement, and requires transportation (to haul sand and a question of ownership or water-use rights that kept from taking the initiative.

#### 11. Support of Infrastructure (Matching Grant)

Relations between local people, their communities, and host country agencies have been intensified by several of the projects. Agricultural agents have made LWR provided seeds available to the people. In a few areas

health services are now provided as direct result of the project. People have begun to depend on host country agencies' inputs and are looking forward to increasing numbers of wells.

The general assumption is that it is desirable to give funds that strengthen government agencies' ability to undertake more local programs. Experience with other projects in Niger, however, (notably in the health sector) has taught the government to be extremely cautious of relying on outside funding to increase local dependency on government agencies. Providing various inputs to delivery systems, in this case vehicles and transportation funds for host country service agents, supply of improved seeds, or well maintenance, repair facilities and expanded well digging programs, create expectations on the part of the local people that could constitute an overload on some government agencies once outside inputs (and support) stop. Fortunately, most of the LWR funding in this respect has been "top off" funding for existing government efforts.

This criteria should be applied with caution.

As far as links from one community to others is concerned, the activities are perhaps too recent to have had much of a stimulating effect. However, it did not take itinerant traders long to find out where garden produce could be bought from gardeners to be profitably sold a different community. Perhaps this is a beginning. People from various project sites in the Telemces area are aware what the project is accomplishing at the neighboring sites. Certain communities have requested LWR wells when they have seen them in neighboring villages.

Linkages between communities (or individual families) and various government agencies certainly have intensified as result of this project. Problems are always highlighted much more than the more successful and fruitful exchanges. The Forest Service, for instance is accused quite frequently as holding up progress in building additional thorn-branch fences, though branches from the planted live-fence bushes could be used. But there is also a positive side. For instance the local agricultural agent in the Damana garden project said about visiting one gardener who actually is not even "in" the project: "I always like to come to this place; the head of the family is a really good gardener and I can learn so much from him!"

Linkages between field agents among different government services also have been strengthened. Cooperation and inter-action between representatives of different services (technical as well as social) especially in the Tillabery and Tchir Tabaraden districts is encouraging. LWR's interest and inputs stimulated this type of working together. Providing vehicles and operating funds for these agents obviously is important. Without inputs of this nature, they could not work together as much as they do, simply because they would not have the means to travel. More important perhaps, LWR projects have given these agents a reason to get together; cooperation is worth little if something positive will not result from the efforts. The Animation Service is perhaps the best example. Unless they have something to diffuse, promote or at least talk about, they can not go into action regardless how well intended they are.

Cooperation between various government agencies is very important to the success of project efforts. Even on a mini-scale, many of the LWR

project activities, are taking advantage of the benefits of an "integrated" approach. So much depends - once more - on the needs-level the people find themselves. Just as soon as basic subsistence needs are fulfilled, follow-through with expanded efforts in health, literacy, etc. make perfect sense and are very much appreciated by the local people. It is this combined approach that ultimately effects overall living standards more than simply concentrating on more water or, for that matter, on more onions.

## 12. Project Planning and Implementing Capabilities (Matching Grant)

Host country project management capabilities (and problems) have already been discussed under eight above. The constraints are apparent everywhere. Encouraging signs do exist and have been made stronger by many of these project inputs.

New or improved services have resulted from the program. Agents have been able to provide improved vegetable seeds to the gardeners. The Rural Animation service also was able to provide extension-type information on the project's aims, how it will work, what benefits it will bring, and how people can assist the activities to work better, faster and more effectively. The two infrastructure projects (Fruit tree nursery and Gaya forestry) provide government agencies with better skills, approaches and solutions that eventually will directly benefit the local farmers or gardeners. Community response, in the case of the forestry project, has been less than enthusiastic, but this will change once the right approach has been found.

## 13. Conclusion

The "best" projects, according to the results shown in the table are: Telemces, Tanguechmane, the Filingue wells and the Tahoua gardens. All of these projects provide either food or water where they are most needed. In addition to increasing necessary basic commodities, they provide an opportunity for people to work where they live (instead of having to migrate during the dry part of the year). Where production exceeds subsistence needs, projects help people generate income and enable work toward "community development" to begin.

The projects with the lowest scores are the Damana gardens and Gaya. In the case of Damana, a project which has come to the end of LWR financing, the government agent newly in charge simply does not see the need to get the people themselves involved. Instead of providing assistance to local farmers and gardeners, inputs provided by the donor are used to set up and manage an unsuccessful government-run operation. Because of logistic, administrative and managerial shortfalls benefits are kept from reaching local people who continue to manage on their own (without project help).

In the Gaya project, trees are planted by residents in areas inside the forest reserve which was opened up to contract farming. The major problem remains for the Forest Service to find a way to get together with the people to develop a mutually acceptable formula of tree protection and maintenance. Additional work along these lines will be carried out by the AID/FLUP project. Chances are good that in time a more successful approach will be found. LWR's efforts at least have resulted in producing additional trees of different (and much desired) species that will assist the Forest Service in making subsequent trials more meaningful to the local people.

## IMPACTS AND POTENTIALS

### Economic

The most easily measured economic impact is the increased availability of garden vegetables from project gardeners. Not only did people speak of increased food for themselves, but most gardeners had surplus vegetables to sell. The gross receipts per hectare, as reported by gardeners, range between \$400 and \$2,000. During the earlier years farmers had access to highly subsidized seed, fertilizer, and insecticide. As the various projects mature, gardeners begin to pay larger percentages of the cost. Labor, provided largely by family members, is estimated to involve twenty person months per hectare per season, which amounts to approximately \$40 per person month.

Where farmers have concentrated on selling part of their produce they have been able to generate considerable cash. Demand for vegetable produce is such that marketing does not appear to be an insurmountable problem. Markets 40-80 km away from garden areas appear to get produce by donkey or by trucks of roving merchants. Price setting by agreement between gardeners as well as developing transportation and marketing infrastructure have been identified by gardeners and agents as possible future project activities.

Less easily measurable economic benefits include increased production of animal feed from windbreaks and hedge rows, literacy and numeracy helping people market their produce more skillfully, and health and/or strength from

a more available and diversified food supply. Animal watering wells prevent potential animal weight loss by providing good water at various sites and an emergency back-up to the more sophisticated government wells when their fuel is gone or pumps are broken. Village wells make better quality water available at more convenient time saving points. All wells which replace traditional wells also save time in construction and upkeep, as traditional wells require more frequent cleaning, sometimes daily, and complete redigging at least once a year. For gardening, the unusable sites of collapsed wells may occupy as much as an eighth of the available gardening space.

### Social

Villagers speak of gardens providing an economic alternative to going into urban areas to search for jobs. Herders speak of wells providing a way to be more stable. Traditional pastoralists who lost herds during the drought have settled into gardening. Participants in gardening programs also cite advantages of literacy, more available health supplies, and the general raise in standard of living. The project has helped legitimized gardening so that herders are more careful that animals do not damage the plants.

Negative social impacts are generally not program wide but are project and location specific (to be described more fully with each project). However, they include some displacement of traditional women's gardening by men as soon as modern wells and seeds are made available, some displacement without compensation of land holders by nurseries and other governmental activities, and increased advantages of the more wealthy above those given to the poorest groups. The potential tensions between competitive herding groups which might be increased if only one well were provided at a site is

being minimized by constructing two wells at each location. This practice, common to GON well sites too, provides adequate water for the large number of animals using each site. Potential tensions between herders and gardeners will probably increase unless planning is done to assure unobstructed stock driveways and access to water.

Community cohesion may be increased due to project activities at sites where former nomads and transient laborers have settled. In most other cases, activities appear to build on already existing family relationships, such as wells shared between related neighboring households.

#### Environmental

Wells will concentrate animals in the immediate vicinity. Overgrazing will take place around them. In areas where animal wells are placed in cultivated land, permanent well sites tend to localize manure, enriching only the fields nearby. This contrasts with the traditional, more even distribution of manure when wells had to be re-dug and were purposely re-located to enrich different farmer's fields.

#### Infrastructure

Projects strengthen governmental services by providing transportation, needed materials and top-off funds. The technology offered by LWR does not require heavy equipment and is generally low-cost. The government is pleased to have this input in selected areas where more expensive deeper government wells are not required.

The LWR project inputs also provide a forum through which Nigerien officials plan and organize activities. A number of the collaborative host

country agency efforts in project areas are made possible by LWR funds, and some activities, such as the vegetable oriented nutrition program, are totally GON financed but have been stimulated by the LWR funded gardening efforts.

A danger, which should be carefully monitored, is the potential for the activities to put an overload on already understaffed and under-financed governmental services. Additional local dependence on government programs may be difficult to satisfy once the project terminates.

### LESSONS LEARNED

There are a number of lessons which can be drawn from the LWR program experience. Some of the most important are the following:

1. People are adaptable, are willing, if given a specific framework, to provide basic self-help inputs, will eat "new" vegetables and are able to sell excess produce.
2. Some of the host country agency personnel are capable and committed but their project management dexterity needs to be improved.
3. The LWR project cycle needs considerable tightening. Flexibility is very desirable but appropriate basic funding and project development routine must be refined and followed.
4. Of all the startup problems encountered, the most persistent and most damaging for gardens is the fencing situation. Live fencing is feasible and practical, but is falling seriously behind schedule

because of the Forest Service's rigid attempts to protect existing vegetation. Cutting branches from growing live fence trees is essential for efficient gardening as well as to provide much needed material for repairs of existing and additional fencing for new garden activities. This problem must be addressed even if it means GON changing existing laws and/or instructing agents how and where to relax their rigid views.

5. Vegetable gardens in some areas have been so successful that rapid expansion has resulted in some helter-skelter sprawling of garden plots. This has caused waste of valuable land, unduly restricting access of animals to water and a hodgepodge of trails and roads. General use-plans of the available areas are needed to provide more orderly and efficient development of the available land and water resources. (For details, see technical annex).
6. The LWR program in Niger is complex; each project is different; most locations are relatively remote. A serious attempt should be made to consolidate around the more successful and meaningful individual projects. Where ongoing activities are not meeting expectations they should be abandoned (or discontinued) in favor of fewer and most important efforts.
7. Progress in enhancing host country project management capabilities has been slow and frustrating. "Community development" efforts require a minimum basic affluence of the individuals that are being helped. The goals of the Matching Grant are difficult to achieve

given the basic nature of LWR's project objectives. They are also, perhaps less meaningful given the marginal economic situation of the Nigerien poor.

## RECOMMENDATIONS

The evaluation team makes the following programatic and policy recommendations.

1. Stay with projects that focus on providing more water and/or more food. This is a top priority for Niger and the entire Sahel and one that is basic to Niger. Infrastructure projects are also very relevant but should take second priority.
2. Select six major project clusters concentrate your resources and phase-out all others. In our opinion, major accent should be placed on Telemces (both gardens and herder wells), Tanguetchmane, and Filingue Wells. Projects we believe should also be retained and possibly enforced are Tahoua gardens, Tahoua fruit tree nursery and Them.
3. Continue to carry each project until enough "progress" has been made so community cohesion (and host country inputs) have reached a stage where the activities can continue without further assistance.
4. Keep in mind that different social groups (herder and farmer; men and women, etc) have different goals and ambitions. Avoid

experience and review, may be discontinued in favor of better, more meaningful ones.

- b) Limit expenditures for projects along budget-item and schedule. A certain "overrun" may be allowed, but limits should be established for both excess amount and time.
  - c) Do not continue project funding activities beyond formal agreement or extension dates.
  - d) Make periodic audits for accuracy and completeness of project expenditures including full review of receipts, payroll records and other project expense vouchers. This is nothing but necessary and smart business and will not be interpreted as mistrust. The emergency status that existed as direct result of the drought is now over. Rapid expenditures are no longer needed to save lives; a more thorough and systematic approach to control funds is needed to keep records straight and "slack" to a minimum.
7. Develop a more effective live-fence maintenance and exploitation formula. This is a top priority for the LWR/Niger staff and a major bottleneck to expanding the gardening program.

Since the problem covers several departments, the matter has to be brought to the attention of the head of the Forest Service in Niamey:

assisting one group at the expense of another. Strive for equity and balance of benefits.

5. Readjust staff authority and responsibilities so staff personnel can spend more time in the field at project sites. Staff presence and contacts in the field are crucial. Each project should have actual staff presence at least five to ten days each month.
  
6. Tighter financial control and project administration are necessary for both host country and donor. LWR/NY and LWR/Niger have both become aware of the problems of "prefinancing". Although this provided the LWR/Niger staff a mechanism enabling it to act in a timely and responsive manner, it has produced vague records and unclear informal "off the record" arrangements with the Nigeriens related to project implementation. This "informal" process handicapped the evaluation team in determining actual amounts of money spent and dates project activity began. The evaluators believe the process could be formalized by the following:
  - a) Formalize "prefinancing" which is limited in time and amount. Ten percent of total yearly in-country budget could be set aside, half to be covered or reimbursed by project funds once the formal agreement has been reached, the other half to be used to develop and try new ideas that may not become full fledged projects. This 5% experimental fund is desirable as not every idea for a new activity will lead to a top quality project. They provide start-up money, for efforts which, upon further

- a) Prepare a problem-statement file citing the specific locations, cases and situations where Forest Service field agents must intervene and explain to farmers what can be done to cutback live-fence hedges to their proper size and how branches can be cut to provide additional material for garden fences.
- b) Present the problem to the Forest Service, together with the suggestion that LWR would be most interested in assisting Forest Service field agents to visit project sites and to undertake joint-actions with the local people to make the necessary changes.
- c) Supply a first batch of hand tools (pruning saws and machettes) at each site so that work can immediately begin.
- d) Keep the Forest Service's Bureau Technique Forestier (part of the AID/FLUP project) informed of these steps and solicit its assistance in getting these efforts underway.
- e) At the same time, discuss other possible forestry interventions that can be added easily to the gardening efforts: raising more trees to increase supply of fence-branches, introducing food-trees (like: *Moringa oleifera*) into gardens, etc. Another possibility would be adding certain soil conservation techniques to some of the gardening efforts.

### III. PROJECT ANALYSIS

#### PAF - FILINGUE WELLS

##### A. Project History

The main thrust of the project since its beginning has been to provide a ground water development technology that eliminates the drawbacks of the traditional system. The use of concrete culvert sections to line wells provides a more maintenance free, longer lasting well with yields, water quality and longevity greatly improved.

With these goals in mind, official PAF phase I activities started in 1979 with LWR funds, materials, and equipment (concrete forms, and tools) as well as an important training component to instruct local villagers as technicians in all aspects of well digging and ground water development.

The success and ready acceptance of these activities and local volunteer participation in providing labor, sand and gravel led LWR to add a second phase which is presently on-going.

In response to community needs and suggestions by local people, 32 small stock watering tanks were added to the original 100 planned.

Aprons (concrete slabs) also were added around the wells to improve sanitary conditions and reduce contamination of the well water.

Partly thanks to effective efforts of the rural animation (host country lead agency) and the intense interest and active local participation, the goals for phase II were doubled.

## B. Current Status

Fifty wells were completed under PAF phase I. So far 12 wells have been finished under phase II. Five more are presently under construction, by 5 teams. See annex C for technical comments and observations. These wells are "public" with apparent free and unlimited access to all.

## C. Impact and Potential

The wells constructed so far have clearly improved quality and quantity of ground water supplies. A PAF I internal evaluation report cited villagers as easily recognizing increased availability of water, increased safety in wells construction and ability to water animals more rapidly.

The locations of these wells were selected by the governmental services on the basis of available demographic data in order to provide general coverage of areas where people live in clusters, thereby ultimately reducing maximum access distance to within approximately 1 km.

These settlement clusters are almost invariably made up of related families, thereby the activities and use of these wells blend into already existing, but do not build new social patterns. The project has a slight negative impact on manure concentration. With permanent well sites, fields removed from the well will have to be manured by hand if they are to be enriched.

The experience gained in this project has been extensively used elsewhere:

the LWR technique is now used on other, more recent LWR projects.

- other donor financed projects (i.e., IRENE, CWS, CARE and AFVP) have used the same basic technology, and technicians of these other projects are being trained by Nigerian LWR well construction personnel.
- the training program, including all other projects developed along with PAF, has resulted in 79 trained technicians, 33 of which are currently not involved in well digging projects.
- in addition, construction costs of a typical well are low enough (approximately 15,000 CFA fr) to make construction of this type of well by private individuals feasible on an independent contract basis.

#### D. Lessons learned

1) Under the auspices of the technical lead agency (Rural Animation), an effective large-scale wells construction effort can be launched if a minimal critical mass of: sensible technology; funds; trained personnel; and project management capability can be combined, and where subsurface and hydrologic conditions are favorable.

2) Location of individual wells must be selected weighing the combined technical, social and spatial considerations.

3) Local interest among stable communities is great enough to make voluntary participation (contributions of free labor) worthwhile to local populations.

4) A carefully managed follow-up is mandatory to ensure lasting benefits of the initial efforts. This includes: deepening and cleaning wells; adding additional cuiverts to the superstructure as the well cylinders continue to

settle to an ultimately balanced depth; and, ensuring sanitary conditions around the well (clean slab, avoid formation of puddles, etc.).

#### E. Recommendations

1) Continue activities with increased accent on project management training and follow-up maintenance (see technical wells annex)

2) Institutionalize the program so that it may continue after LWR funding ceases.

a) Promote the establishment of independent business to contract well digging on private sector basis. Help currently inactive, trained technicians form small enterprises. Offer skill training in marketing, contract management, bookkeeping, work planning, crew supervision, etc. Developing private well construction firms could possibly be added component to LWR's "wells training" project.

b) Now that new wells conform to the GON Water Service (OFEDDES) dimensions (1.40 m diam), contact OFEDDES to explore possibility of "institutionalizing" this program on a country-wide basis. Another option would be working through the Animation Service. Requests for LWR type wells are increasing, the approach is obviously viable. Therefore, a more formal incorporation into the government should be advocated.

c) Increased local cost-sharing (or credit financing) seem entirely possible. The necessary administrative modalities must be developed within the GON.

## DAMANA (Borgo, Damana, .obi)

### A. Project History

Traditionally residents raised some garden crops, mainly tomatoes, manioc, sweet potatoes, using hand dug wells and millet stalk fencing.

In 1979 LWR, in response to a request from the Agriculture Service, started a project to improve winter vegetable gardening by diversifying garden crops (lettuce, potatoes, etc.) The aims of the project were: to introduce live fence; to develop 25 ha in individual 1/4 ha plots; to construct 100 cement lined wells; and to improve farmer's access to fruit trees, seeds, and plant protection products and extension information. A place to grow manioc cuttings and fruit trees in a nursery in Borgo was included. Project activities initially were managed by a dynamic agricultural service technician, who was unfortunately transferred elsewhere.

### B. Current Status

The project finished September, 1981. A total of 120 garden wells have been installed with LWR funding in 3 villages, a number of which do not have fully utilised gardens. Two of these were visited: one had few fruit trees, in the other women were doing laundry and were also raising several peppers and mint plants. According to the wells coordinator, gardening activities around the LWR wells were more "active" under the old agricultural agent.

A number of gardens have sprung up which are not directly connected to LWR wells. Barbed wire fencing was put up but not effectively, inside, gardeners continue to put up traditional fences. The Agriculture Service provides seeds but last year supplies came too late in the season, manioc

cuttings were also delivered out of season while the more dedicated farmers had to go long distances to buy them when they were needed. Farmers also had no choice but to revert mainly to tomatoes as no other seeds were locally available. LWR tried to cover the delivery gap but their seed also arrived too late. Some live fencing has been installed, but success is spotty and trees are presently not properly maintained.

In Borgo a nursery was installed by the agricultural service (on expropriated land), and a few wells were dug. At present, some trees for fruit and fencing are being raised. The manioc cuttings planted are infected and cannot be used as planting stock. Work is presently carried out by paid labor supervised by the project funded local agricultural agents, but the total appearance shows poor management and supervision.

### C. Impact and Potential

After an encouraging start, expansion and extension efforts stalled near the project's termination for various reasons: lack of follow-thru, repeated untimely delivery of seeds and cuttings, inadequate fencing (ineffective use of imported fencing and major failure of trees for live fencing). In addition there are several serious negative sociologic impacts:

- a) at the Borgo nursery; land has been taken away; nursery production is not benefiting former holders of surface-use rights.
- b) At Kobi women were displaced from their traditional gardens, after project inputs became available to the male community.
- c) In Damana it appears that some of the more influential families have received wells that are not fully used for gardening while

some of the poorer people received none and continue the best way they can without the project's benefit.

#### D. Lessons learned

The CARE representative summed up the project problems as: goals were too ambitious, site and participant selection was bad, there was "enforced" participation, some of the more important villagers got wells first and then did not use them intensively, some families fear that if they participate they will "lose land" or will be forced to grow certain new crops while traditional crops require less attention and still give satisfactory results or profits, over-reliance on ineffectively constructed wire fencing, rural outmigration draining available labor during gardening season, sons often refuse to work in their father's garden and older people abandon plots when they become ill.

Gardeners who receive imported metal fencing materials "for a start" do not perceive the need to develop live fencing or other local protection schemes.

#### E. Recommendations:

- 1) Under the circumstances, do not start a second phase unless:
  - a) local host country management shows more concern and commitment to needs, constraints, and expectation of local population, and also shows improved project management capability (planning, proper timing, interservice cooperation);
  - b) responsiveness of local participants is proven;
- 2) Do not provide any further imported metal fencing;

- 3) If manioc is to be promoted, go to the trouble and cost of providing disease resistant planting material;
- 4) Where women do traditional gardening, give them support first as a "women's project", then offer to develop adjacent areas for men; and
- 5) In this location offer support through the young local extension agents, not through the Agricultural Service representative.

## TILLABERY MARES

### A. Project History

This project has two sites, Them and Gaigorou, located on semi-permanent lakes. As the project began, residents, mainly women, were doing some gardening by planting in the wet soils as the water receded during the dry season. They raised mainly cowpeas, tomatoes, and peppers on an area totalling about 4 ha in the two villages. The project, which ran from 1978 to 1980, had the goal of strengthening and diversifying gardening activities around these water sites. During the project the low dam in Them, rebuilt by the French during the colonial period, broke. This left Them with no water for gardening activities.

### B. Current Status

In Them there is a project storage building. However local laborers complain their construction wages were never paid. Although incomplete, it is currently being used by the village chief to house dam construction workers. Most of the gardening tools that were to have been stored there are located in various homes. The dam repair, which has captured the interest of the President himself, is scheduled to be finished by the GON before the rains this year. Until the lake has filled with water, gardening cannot take place to help this isolated and disadvantaged village.

In Gaigorou, on the other hand, the imported project fence is in place though it was ineffectively installed and animals walk in and out of the area. Trees planted for a live hedge have not been trimmed and have effectively turned into a wind break. Residents questioned said the trees had been

planted by men working for outsiders. They believed the trees had something to do with improving the gardens but they did not know what. They found these prosopis trees were good because children liked to eat the pods, but they did not dare cut branches for extended fencing, animal feed, or for making the hedge grow thicker at the base.

The GON Water Service well in Gaigorou is being used for household water, but the LWR well, placed in the traditional women's fields to reinforce garden watering is being used by the women for watering their cow peas and for doing the laundry. There is no apron on this very active well and women stand in wet mud to do their washing and to draw water. An extended area of 4 ha of gardening is being done by men on adjoining land planted mainly in potatoes and improved cow peas introduced by the project. A school garden with a variety of vegetables was established by a dynamic school teacher with inputs from UNICEF. Girls and boys water these plants from the government well and take excellent care of the plot.

### C. Impacts and Potentials

The unfortunate loss of the dam makes the impacts of the project at Them unmeasurable. Only after the water has returned will one be able to evaluate the real interest of the residents in continuing or expanding their gardens. Hard feelings toward the project are apparent among project building construction workers who believe they were not paid for their work. Because the government officials are all new, the use of funds held by the former agriculture agent is unclear.

Gaigorou residents have doubled garden space through project inputs. The UNICEF garden has demonstrated that vegetables can be raised. This would indicate that gardening could be quite profitable especially as this village is conveniently close to roads and markets.

#### D. Lessons Learned

1. The lack of more impressive results of the two projects shows lack of coordinated management and lack of supervision, as well as some unpredictable bad luck.

2. Better records should be kept so when personnel change, the project history and funding information is retained.

3. Live fencing will not be effective if people are relying on metal fences, if Forestry Service agents are not behind the effort, and if residents are not shown rational use of trees for fences.

#### E. Recommendations

If LWR decides to continue this project, future inputs should favor Them rather than Gaigorou due to its remoteness and more difficult living conditions. Before any extension is made for Them, however, the interest of villagers should be noted after the water is in place. Perhaps LWR will decide on continuing efforts in either or both of the two towns to maximize transport and other investment of the very capable new Tillabery agents who may set funds to work in Tanguetchmane. If this is the case, efforts should revolve around balanced use of available water, systematic development and protection of garden areas (live fencing and wind breaks) and animal access

routes. Care should also be taken to see that women have access to improved seeds and that they will not be displaced from their traditional gardening areas as the men's gardens expand.

Whether new phases are started or not, negative impacts from the projects already completed, should be kept in mind. First, the confusion over the payment of laborers on the LWR building in Them should be resolved. Second, a cement slab apron for women doing their laundry should be added to the Gaigorou LWR well.

## TELEMCES

### A. Project History

Before project activities began in the Telemces area, there were approximately 25 families in four of the project locations who gardened less than a total of 10 hectares. Products were gourds, tomatoes, hot peppers, cow peas, and probably wheat. Gardening was done on an irregular basis mainly by Bella as part of their activities for the Toureg community, according to traditional ethnic relationships.

From the beginning of the project in 1977 to date, LWR has spent \$150,000. This has been a collaborative effort with GON. The GON has provided an on site agricultural specialist as project manager, trained extension workers most of whom also teach literacy, a forestry official, health workers, midwives, and a community development (animation) service officer. LWR has provided a project officer, a vehicle and transportation funds for the GON project manager, pays salaries of extension workers, provides their housing and supplies, furnishes plastic bags, small tools and laborers salaries to the forestry workers, and makes available supplies for the health workers.

### B. Current Status

In the eight villages involved currently there are:

7 village wells

14 herder wells

37 garden wells

130 families involved in garden programs

75 ha garden surface

improved road sections

7 midwives

8 village health workers

5 extension workers/literacy instructors

1 literacy instructor

7 animation centers

The new phase of this project assists continuation of above activities and adds the development of herder wells in the vicinity of Tchín Tabaraden. This aspect of the project is under the direction of the Animation Service rather than an agricultural representative. The thrust of this effort is to, unlike in the rest of the sites, obtain the active participation of the herders in well digging. From the sites visited and from conversations with residents and with project officials having had experience with these efforts in other areas, it is not certain that this is a realistic plan. Nomadic herders do not appear to be too interested in participating. Those who have helped elsewhere have tended to claim ownership of the finished wells.

### C. Impacts and Potentials

The most apparent impact is the rapid growth of the number of gardeners and garden surfaces which has taken place in just five years. A number of families in Gaouey, for instance, speak of having recently come to the area to surface-mine phosphate. With the addition of gardening, they were able to settle and have an adequate food supply. In Gamban gardeners spoke of jobs such as trading salt across the desert and the fact that gardening offered a viable alternative income as trade waned. Local people

are adding the vegetables to their diets. Groups of children or adults of various ethnic and social groups, both from families with gardens and those without, describe preferences for various vegetables, and women describe methods of preparation. Also, despite the remoteness of the mares, gardeners are selling vegetables. Traders in small trucks are starting to stop regularly which gives support to the idea that gardening can profitably expand.

The governmental team from Tchín Tabaraden functions quite well in this project (second only to Tillabery) and the LWR project officer has excellent relationships with local authorities and service chiefs. Interestingly, the garden projects in the Tchín Tabaraden district are working well even though there is no agriculture district office in this area.

There are several factors which create some negative impacts at the various projects. Some of the wells have no aprons, and, especially at herder/village wells, this creates potential health hazards. People and animals stand in water filled with manure, etc., compacting the earth further so the wastes run toward, not away from the wells. A second negative impact is the lack of land use plans which is apparent especially in Gamban where a garden irrigation ditch crosses a stock driveway near the water's edge. Balanced and effective use of limited water resource will be increasingly important as the projects grow.

One specific spinoff to this project is expansion of services offered by the GON. An example is the training, by the Animation Service, of a team of two women nutritionists. These women teach vegetable preparation to women

representatives (chosen by the village women themselves) who will in turn train other women in their villages. They use such things as local couri-couri (a peanut paste left after oil is extracted) to enrich the protein content of vegetable dishes. Because the highest death rate for children is during the weaning period, the focus is especially on weaning foods. The program is too new to measure its impacts but it was surely inspired by the availability of new vegetables introduced through LWR assistance.

Prospects for continuing gardening after funding has stopped are good if the serious problem of fencing can be solved. The traditional way of fencing, cutting and using thorn branches, is illegal. The forestry agents have not exercised their authority to allow reasonable exceptions. Gardeners found to have cut branches are fined \$20.00 per branch. In Gaouey several women complained they would like to plant gardens but they had no way to clear the bushes or fence their area in fear of fines. A male gardener, given bags and seeds and told to raise future hedge trees for the forestry service, was not permitted to add branches to strengthen his fence even to protect his "volunteer" work for the foresters. In Taza potential gardeners with identified plots were unable to start activities due to inability to protect them. In Gambane a gardener of several seasons said he would have to give up gardening next year because his thorn hedge was becoming too weak without regular reinforcement. The future of gardening in this whole project area depends upon resolving the problem of protection. Other than this point, gardeners who are seeing the potential of this activity and are learning necessary skills, will be able to continue after project impacts have stopped.

The future would appear to be especially bright if a rational land use plan could help the gardeners avoid future conflicts with herders.

Road improvement, which was part of this project, was not well planned and some of the materials were of questionable quality, etc. However, although this has been considered a complete failure by former evaluations, local residents explained that despite its rough surface condition, it offers the only possible route to Tahoua during the rainy season. They are very grateful to have a road which keeps them from being cut off from the outside during the rains.

#### D. Lessons Learned

This project demonstrates clearly that people are adaptable--going into gardening even when it is quite different from their traditional occupations. The remoteness of these sites has not proven to be an insurmountable problem as far as marketing is concerned. On the contrary this remoteness offers the advantage of making the project the only outside supported activity in the region. This means government officials as well as local residents do not have their efforts diffused by numerous other activities. The projects have also demonstrated that gardening can be used as a tool to provide basic food, and, thereafter, foster community development. In this region which lacks alternative materials for traditional fencing the project will fail if problems with the Forestry Service are not resolved. Finally, these activities demonstrate the potential problems of unplanned development of garden plots if other human and animal needs are not included in over-all planning.

#### E. Recommendations

Stress the following in future activities:

- 1) Planning
- 2) Live fencing for holders of land use rights; alternatives for those borrowing or renting land.
- 3) Watch allocation of plots especially for newcomers who lack established land-use rights.
- 4) Do not unreasonably stress participation of nomads in volunteer self-help well digging. Where herders or others do participate, watch for priority claims to water. Regardless, cement lined herder wells make good sense in areas with traditional wells, where groundwater is shallow and soils are appropriate for this technique.

#### IV. PROJECT REVIEW

##### TANGUECHMANE

###### A. Project Background

Minor funding has been started by the U. S. Embassy Self Help Fund and LWR. Technical proposal has now been submitted by the district agents and is awaiting departmental clearance. Seven technical services plan to work together in an unusually effective collaborative spirit.

Before project efforts began, gourds and cow peas were raised here by few people from Oualam who were displaced by the drought. New gardeners asked permission to settle from residents. Currently a semi-sedentary scattered village of 42 families is in place. Permanent fencing is not yet installed. Seed potatoes for several hectares have been well used. A local style house has been constructed for a literacy center by self-help. It is used by the agricultural extension agent for literacy training in Hausa and Tamacheck. Also, local people built a house for the agent (100% self-help). One training well set up for Daloul animal powered water lifting is not in use but no one explained why. A second well is under construction. Some residents have been helping local wells technicians. (These residents believe they should get paid for their work.) Two GON trained village health workers with some medical supplies furnished by LWR are on hand. Livestock service technicians provide basic animal health care and vaccinations (GON input). Impressive live fence/windbreak rows of profuse natural regeneration of *A. scorpioides* offers seeds which can be sold for leather tanning.

Men are currently doing all the local work. Last year's rains were disastrously insufficient. Presently there is no food on hand in the village. Women now are gathering "wild" food products (mainly lilly bulbs growing along the Niger River 40 km away). Many young women and men have left looking for food and are living with relatives in other villages. Men expressed hope that expanded gardening in future years can keep the families together during the dry season. Villages appear quite eager for increased gardening opportunity and prospects of having host country agents and donor collaborating in providing effective input is very good.

#### B. Impact and Potential

Small preproject inputs appear to have been used effectively.

- The potential for women to also garden and join literacy classes is good.

- Project site is an impressive example of combination of:

- great basic needs

- local interest

- host country agency willingness to assist in providing basic coverage

- A local man remarked "How can the women stay here to garden when there is no food in the village? Once we have learned to garden and there is food, we will show the women how and they can join us." What they said they need most is "knowing how."

#### C. Recommendations

Recommend funding as outlined in face sheet.

- Place accent on overall resource use and development plan, identify irrigated perimeters, windbreak system, (conserve residual tree groves and forest stands,) and livestock access to water, etc.

- Live fencing (mostly natural regeneration) can be used to protect gardens. Forest service inputs are required to work with gardeners to show how existing trees can be pruned effectively.

## TAHOUA GARDENS

### A. Background

Shortly after the drought, the first garden activities started spontaneously in the major valley near Tahoua around traditionally dug wells (some up to 12 m. deep). About 7 years ago the agriculture service began to support individual gardening plots and subsequently solicited funds from LRW to introduce concrete lined wells. LWR began assistance in 1981.

The Agricultural Service compiled a list of those willing to provide sand, gravel and labor for well construction and began drawing up a well construction and garden improvement schedule. Since then 79 wells have been constructed and gardens have profited from other project activities: agriculture extension services, seeds, rural animation, and forest service.

### B. Impact and Potential

A ready market for fresh garden produce and fruit exists in Tahoua. The availability and variety of vegetables from a total of 340 garden plots has increased dramatically during the last few years. Much of this is directly related to project activities with the introduction of new and different seeds, methods to lengthen the season, etc.

The speed of garden expansion is such that a market saturation may occur before long. A cooperative has been formed to help gardeners deal with future marketing problems. One remedy is to plant fruit trees in the garden plots. As these trees grow, their shade will reduce the areas available to vegetable production (keeping the supplies at reasonable levels), at the same time fruit production will increase as trees begin to bear.

Demand for citrus and mangoes is practically unlimited. Fruit that can be transported by traditional means will find its way deep into the back country and will be appreciated by both sedentary population as well as pastoralists.

Surfaces of "good" garden plots (those with relatively high ground water table and good soils) are scarce.

Present well digging technologies are restricted to loose sandy soils. Where rock is encountered other digging methods may have to be used. This is important because the only plots available to the poorer settlers are located where present methods may not work as well.

The cash income from some of the older gardens, according to preliminary observations, is quite high: maximum gross receipts of over \$800.00 per "plot" (roughly 1/2 ha) have been observed. At that rate, individual families, especially the larger, established ones, can in the near future be expected to pay for construction of additional wells, perhaps with some credit assistance.

C. Recommendations:

1) Continue efforts with accent on:

- introduction of fruit trees (from Tahoua fruit tree nursery project) which will require year-round protection.
- socially equitable allocation of additional (limited) plots to individuals and families (poor, women, etc.)

establishment of project wind-break system according to an overall (coordinated) plan.

- establishment of live fencing around individual plots: windbreaks and live fencing, properly managed, can produce the necessary thorn branches to establish temporary fences around new plots.
- 2) Assist in further expanding existing market and credit pre-cooperatives called "mutual groups".
- 3) Begin systematic efforts for gardeners to produce their own improved vegetable seeds. (See technical annex)

## TAHOUA FRUIT TREE NURSERY

### A. Background

GON is making a concentrated effort to establish a fruit tree nursery in each of its 7 regions. The nurseries are to mass produce improved varieties of especially appreciated fruit trees such as grafted mangoes and citrus, with guavas, papayas, and bananas providing additional variety. Donor response in general has been favorable for other departments located in areas with better water supplies and soils.

With LWR inputs, nursery installation and first attempts to grow grafting stock have begun also in this region. The first results have been somewhat less than encouraging: (15% survival for recently planted mango seedlings), relatively heavy reliance on expensive foreign material for fencing and water distribution system and installation on land where surface use-right holders were displaced without compensation.

### B. Impact and Potential

- The GON project manager has cooperated well with LWR. His reports are excellent and the most comprehensive of all projects reviewed.
- Other impacts too early to judge.
- Contrary to other project activities described thus far, this is an "infrastructure" project not aimed at a direct specific target population and it is not designed to especially help the poorest of the poor. However, to increase the supply of fruit tree seedlings in a region where malnutrition and unbalanced diets are all too frequent, is obviously in line with LWR and GON's priorities.

The nature of this activity demands a fair amount of project management skills on the part of the host country agencies involved in the implementation (per "Matching Grant" Objective C)

C. Recommendations:

Continue support placing accent on:

- assisting host country agents through joint reviews, in house evaluations, work sessions, etc., to increase efficiency of activities (cost effectiveness), proper placing and timely execution of work, minimizing waste through coordination of extension activities.
- assist project manager in selecting satellite nursery locations emphasizing the participatory socio-economic aspects.

Strongly encourage:

- more use of local materials for fencing
- establishment of multipurpose tree windbreaks
- use of labor intensive work methods
- as nursery output increases, begin fruit tree extension efforts stressing year-round protection requirements.

## GAYA

A. Background

Located in the most favorable part of Niger, the Goroubaroum Forest Reserve could provide an ideal setting for agro-forestry activities with local farmers and the government forest service working together to optimize available national resources.

During the design phase of AID's FLUP (Forest and Land Use Planning Project) in 1979, this forest was identified as site to carry out experiments in developing modalities of a successful agro-forestry effort. This example was to serve as a stepping stone for establishing similar activities in some of the other forest reserves of Niger.

While the AID project starting date was still some time off, LWR decided to provide some fillgap assistance taking advantage two planting seasons before FLUP activities could begin.

Official project activities began in 1980 when LWR funds were made available to the local Forestry Service agent. As a relatively "silent" partner, LWR inputs have been used to pay four nursery workers, provide some nursery and planting equipment, wells improvement and to pay for experimental regeneration of food trees (Karite, Tamarind, Baobab, etc.).

The results so far are not conclusive. Although trees of various species were successfully produced in the nursery and planted, the basic problem yet to resolve is how to properly protect trees against bush fires, free roaming animals, and other hazards. An approach that incorporates the interests and needs of the local farmers which would give them reasons to provide adequate

protection has not yet been found. The situation is further complicated by the fact that the forest reserve was established in 1935, under colonial rule, on land that belonged to the local villagers in the first place!

B. Impact and Potential

- LWR's timely assistance (before AID could get in gear) saved two planting seasons.
- The significance of these efforts can not be stressed too much. If it were possible to develop a collaborative approach which satisfied the local people and addressed the mandated forest service responsibility for balanced and sustained yield use of the forest, a major step could be taken toward resolving problems of over and abuse of government reserves.

C. Recommendations:

- Continue grant funding but advise the Forestry Service that LWR is not interested in considering additional inputs unless by Feb. 83, at least 50% of the trees planted this year are in reasonably good shape (not burnt or grazed).
- Assist Forest Service and FLUP, advocating:
  - experimental approach (under 10 ha per trial) offering villagers choices of protection they can carry out themselves.
  - working more directly with villagers so they understand they will not be required to move to new areas if trees are successful.
  - bring in a social scientist (IRSH, Peace Corps, etc.) to focus on improving communications between villagers and the project.

ANNEX A

TERMS OF REFERENCE

ITINERARY

MAP OF PROJECT SITES

## LUTHERAN WORLD RELIEF

### SCOPE OF WORK PROGRAM EVALUATION IN NIGER

#### Background

Since 1975 Lutheran World Relief has supported about 15 projects in Niger backed up with personnel and related support for a total cumulative expenditure to December 31, 1981 of approximately \$1,800,000. The actual expenditure was approximately \$750,000 and the budget for 1982 is projected at \$938,000. LWR entered Niger because of the country's location within the severely drought-affected Sahelian Region. The program supported has focused on water resource development primarily for small scale dry season agriculture and secondarily for human consumption. Projects have also included promotion of adult literacy, cooperatives, forestation and women's involvement. While the program is believed to have demonstrated considerable potential for dry season food production in selected areas, Niger has continued to be a food deficit country during the past half decade which had been characterized by relatively better annual rainfall.

Unlike LWR's normal practice of supporting projects through national counterpart agencies, there is a field staff of five LWR expatriates overseeing the Niger program. However, projects themselves are implemented by the technical services of the Ministry of Rural Development through their local Chef de Service.

Given the substantial commitment of resources, both past and planned, it is essential that LWR procure an independent assessment of the impact of projects supported in Niger. Such an independent assessment would be expected to inform future program planning and provide a more complete, comprehensive and systematic review of the program than has been available in the past.

Substantial amounts of AID matching grant funds have been committed to and expended in support of projects in Niger. Among the expectations in the

matching grant agreement is that adequate evaluation will be conducted. An independent assessment would enable LWR to meet this expectation both through the findings of the assessment itself as well as by providing an enhanced context for understanding the significance of self-evaluations conducted by Nigerien government services.

#### Objectives of the Evaluation

Based on intensive field visits and interviews, as well as a review of background information and orientation from the LWR/New York and LWR/Niamey staff, the evaluators will:

- A. Describe and critically analyze how this program has contributed to the attainment of the matching grant purposes,
- B. Report on specific aspects of the individual projects that may be of interest for replication purposes in other LWR program and/or by other agencies, and
- C. Highlight lessons learned during the programs's implementation and make recommendations for future activity.

#### Scope of Work

Specially, the evaluators will design interview instruments and activities that will enable them to address the following issues:

##### A. General

1. Were LWR Development Strategy Guidelines followed in implementing this program? Did this have either a positive or negative impact on the program's results? Explain.
2. Was LWR's response adequate in terms of program administration/management, eg. timely responses to proposals, timely support, effective liaison between local service and officials in Niamey, cultural sensitivity, technical skills of personnel, etc.
3. Would credit financing of projects be a viable alternative to the

present system of grants? What changes in the present structure would be required?

4. What general recommendations can be made in terms of future LWR personnel, financing, and activities.

B. Matching Grant

1. Purpose A: To stimulate individual communities to undertake their own development by participating successfully in projects designed to meet basic human needs.
  - (a) What role did the community play in project identification, design, implementation and evaluation? Describe. Quantify. Analyze.
  - (b) What relationship, if any, will the community's role have on the future life of the project, beyond the involvement of LWR?
  - (c) What relationship, if any, did the community's role have to the ability of the projects to meet basic human needs?
  - (d) Were basic human needs met in terms of food production, drinking water: availability, consumption and improved health? Describe and quantify.
  - (e) What impact, if any, has there been on the environment as a direct result of the program?
  - (f) Have the communities' designed other projects, outside the scope of the LWR program, as a result of their experience of working together in this instance? List. If not, why not?
2. Purpose B: To support the development of an infrastructure (network) in Third World Countries which is capable of and committed to continued development (assistance) beyond the period of the grant.
  - (a) What linkages exist, as a result of the program, at the community-to-community level?

- (b) What linkages exist at the community-to-government services (or other agency) level?
  - (c) What linkages exist among the various government services?
  - (d) What has LWR's role been in this area?
  - (e) To what degree is the development of linkages dependent on LWR's input, financial or otherwise?
  - (f) What impact, if any, have these linkages had on socio-economic benefits of the program?
3. Purpose C: To assist indigenous counterpart agencies to become more effective in planning, implementing, and evaluating development programs in collaboration with local communities
- (a) What new or improved services for communities have been developed as a result of the LWR program and how have communities responded to these services?
  - (b) What new or improved internal management practices have been developed as a result of the LWR input?
  - (c) What has been the nature of the LWR input, and what recommendations could be made for future activity?
  - (d) Is there evidence that these improvements have been applied on a broader basis than just the LWR program? Other government agencies?
  - (e) What impact, if any, have these activities had on the socio-economic benefits of the program?
  - (f) To what degree are the new/improved services or management practices dependent on LWR's input, financial and otherwise?

NOTE: It is recognized that while some of the above can be measured based on hard quantitative information, other conclusions will require inferences to be drawn from field interviews, or simply be fairly subjective judgements.

Work Plan

LWR will contract two consultants with expertise, training and experience in appropriate fields. The consultants will be given orientation about LWR, the Niger program, and the matching grant by LWR staff in New York and additional orientation specific to Niger projects and operations in Niger itself. This orientation will include a program profile listing information on the activities of various projects to be prepared by LWR staff. The consultants will conduct both joint and separate field visits to project sites. Their field review will include discussions and interviews with project participants in affected communities, local officials and the appropriate staff of government technical services who implement the project. The specific techniques and instruments to be used for gathering data will be designed by the consultants themselves, taking into consideration what they learn from LWR staff, anticipated sensitivities of the people they will interview and the needs of their professional disciplines. On completion of their field work, the consultants will prepare either separately or jointly an outline of their findings and recommendations. These will be discussed with staff in Niger for feedback prior to the consultants' departure, and with New York staff prior to preparation of the final report.

Actual orientation and field work in Niger will begin not later than February 6, 1982. Approximately one week will be spent with both consultants working together in Niamey and in field sites visits. An additional week of field sites visits can be done separately by each consultant. An outline of findings and recommendations will be presented by each consultant in Niger prior to departure, and to New York staff not later than March \_\_\_\_, 1982. A final report will be prepared and available to New York staff by March \_\_\_\_, 1982.

LWR staff in Niger and visiting staff from New York will be observer-participants and will provide logistical support as necessary. The findings

of the consultants, however, will be their responsibility. LWR staff will participate to be able better to learn from the findings of the evaluation and to assist the consultants in gaining access to project participants and managers.

Precise travel schedules and field visitation schedules will be worked out by mutual agreement with the consultants. A total of 20 working days for each of the two consultants will be provided for.

Budget

20 working days x 2 consultants x \$200 per day	\$ 8,000
Air travel	ca. 3,000
Housing, local travel, etc.	ca. <u>4,000</u>
<b>TOTAL</b>	<b>\$15,000</b>

PROGRAMME DE VISITE DE L'EQUIPE  
D'EVALUATION DE LWR - NEW YORK  
NIGER: 5 AU 28 FEVRIER 1982

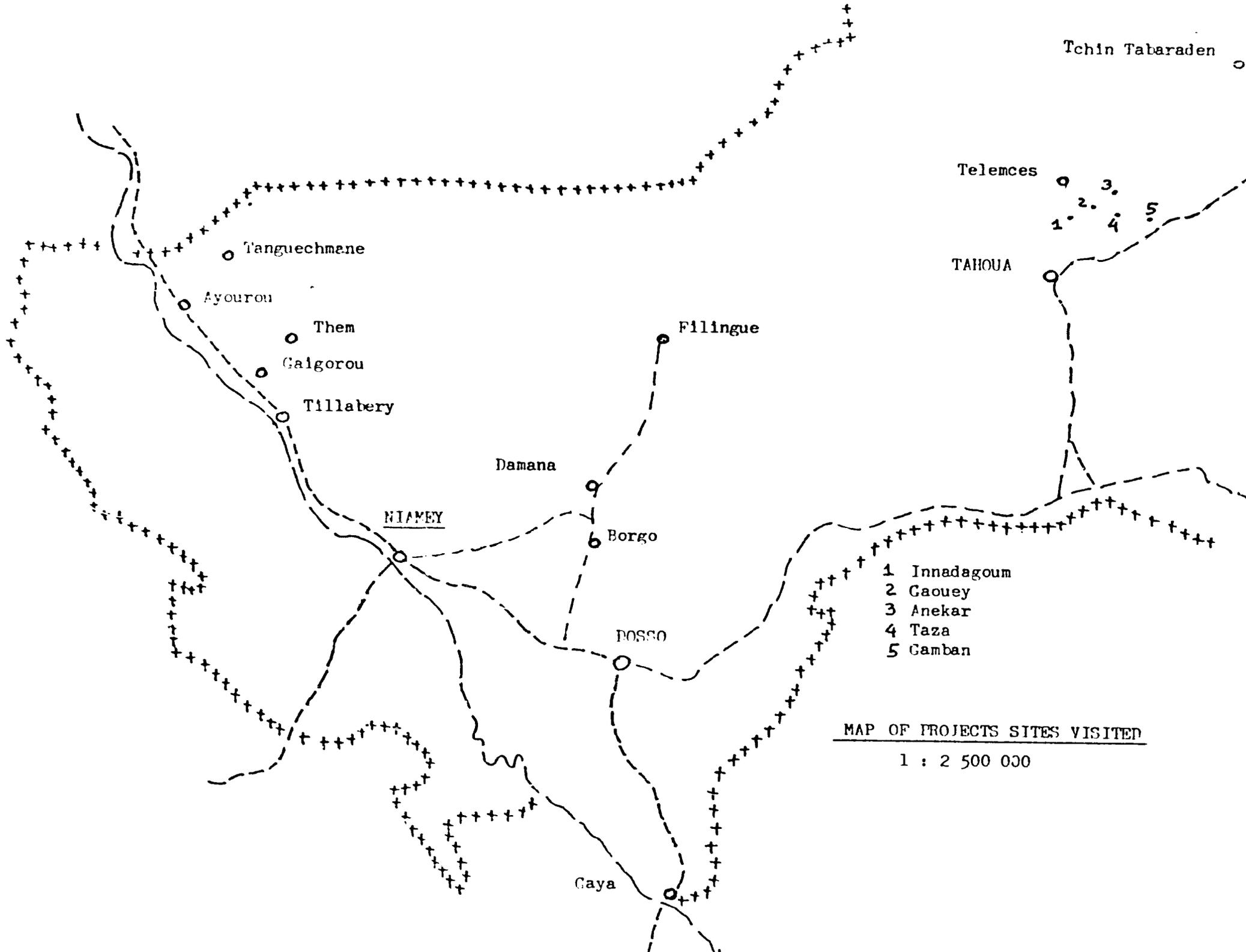
- 5 Février : 14h05 Arrivée à Niamey, RK29  
Hôtel: Grand Hôtel/Niamey
- 8 Fév. : 8h00 Rencontre avec le personnel du LWR  
10h00 Correspondant National des ONG.  
11h00 G.A.P. Secrétaire Permanent.  
14h00 U.S.A.I.D.  
15h00 Chargé d'affaires de l'Ambassade des U.S.A.  
19h00 Réception chez Fred Eberhart
- 9 Fév. : 8h15 SIM  
9h30 CARE  
11h00 CWS  
15h45 Service Agricole Départemental de Niamey  
16h45 Service Départemental de l'Animation de Niamey
- 10 Fév. : Départ pour Filingué  
Projet Puits et Abreuvoirs Filingué Phase II  
Retour à Niamey
- 11 Fév. : Départ pour Balléyara  
Projet Damana  
Projet Berge  
Retour à Niamey
- 12 Fév. : Départ pour Tillabéry  
Projet Mars Tillabéry

- 13 Février :           Projet Jardinage Tanguetchman (en instance)  
Retour à Niamey
- 15 Fév.     :           Départ pour Tahoua  
Projet Pépinière Fruitière de Tahoua
- 16 Fév.     :           Rencontre avec les autorités  
Projet Jardinage Tahoua
- 17 Fév.     :           Départ pour Tchintabaraden  
(Projet Jardinage Telemcès:  
Visite des puiscaris Eleveurs
- 18 Fév.     :           Départ pour Telemcès  
Projet Jardinage Telemcès
- 19 Fév.     :           Départ pour Agadez  
(Arrivée de Norman Barth au Niger)
- 20 Fév.     :           Rencontre avec les autorités à Agadez  
Barth, Lellalid, Schulz à Agadez  
14h00       Retour de Weber et Hoskins à Niamey
- 22 Fév.     :           Départ pour Arlit  
Projet Aide aux Jardiniers (en instance)  
Retour à Agadez
- 23 Fév.     :           Départ pour Tahoua  
Rencontre avec les autorités
- 24 Fév.     :           Départ pour Bouza  
Projet Chandigui (en instance)  
Départ pour Madaoua  
Projet Onion (en instance)

25 Février :           Départ pour Birni N'Konni  
                          Projet Mars et Bas Fonds

26 Fév.       :           Retour à Niamey

      Mars     :           Départ



MAP OF PROJECTS SITES VISITED

1 : 2 500 000

## ANNEX B TECHNICAL COMMENTS

WELL CONSTRUCTION AND MAINTENANCE

The basic principle of constructing sections of concrete pipe at ground level with subsequent excavation of the soil inside so that they slowly sink into the ground, has proven itself as a relatively inexpensive, simple and practical technology. The method requires little investment and provides a reliable way to reach groundwater tables safely and with minimum effort.

Three limits impose themselves. These three were all experienced during the construction of various project wells:

- a) Depth of excavation inside the pipe walls during construction, is limited to how far below the water levels x) workers can safely reach.
- b) The substrata being excavated must be relatively loose (such as sand) otherwise the concrete sections, which must be firmly tied to each other to prevent gaps in the pipe, get caught against the walls of the hole and jam.
- c) There are limits to the depth such pipes can be lowered until first water is reached; beyond eight to ten meters the excavation and settling process will become troublesome.

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x) One of the biggest problems of hand dug wells anywhere: not enough penetration into the aquifer: wells dry-out soon and often.

These basic limitations must be kept in mind when "expansion", "replication" and "institutionalizing" of the approach are considered or wherever this system is introduced at new locations:

- a) Soils must be relatively loose (sandy) all the way to the water level, and
- b) Groundwater levels must be relatively shallow, generally not over 10 meters.

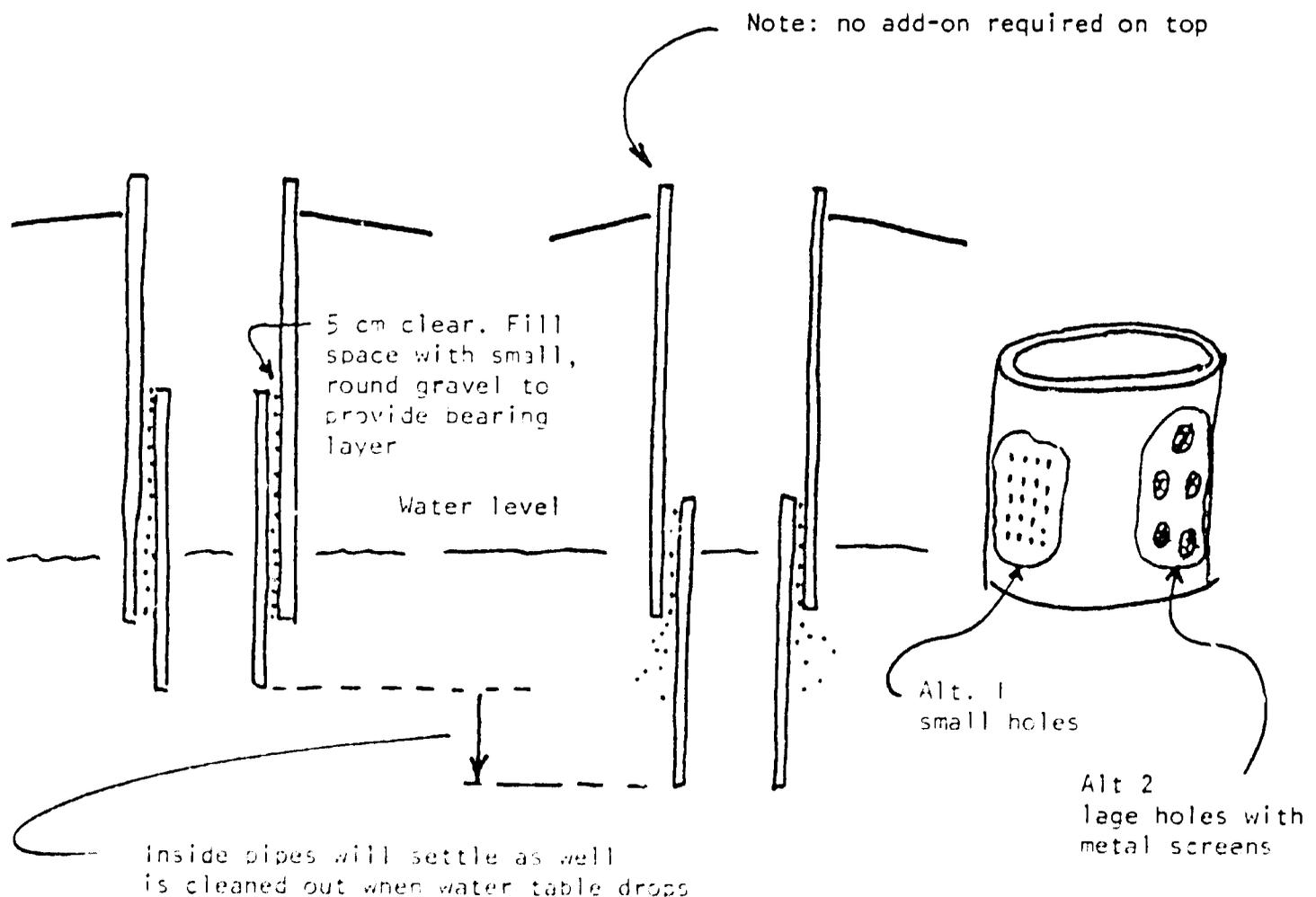
The more pipe sections that are hooked together and the longer the total well-wall-cylinder, the more the stress exerted on the connecting links between pipe sections. Too much weight may lead to joint-breaks causing the pipe to jam and/or settle at an angle.

The practical limits given by the restricted depth of under-water excavation will cause wells to go dry as the watertable drops to its seasonal low. In dry years, watertables can drop below previous years' levels. Not all wells can be dug at the moment when groundwater tables are at their lowest. At any rate, deepening of these wells, especially during their first two or three years after construction, is inevitable and must be expected.

As long as the entire program in one particular area only deals with 20 or 30 wells, deepening activities can be carried out within a reasonable logistic and management framework provided the necessary personnel, equipment and transport is available. Upkeep and maintenance is necessary to prevent the rim of the top pipes from sinking below the surrounding ground surface.

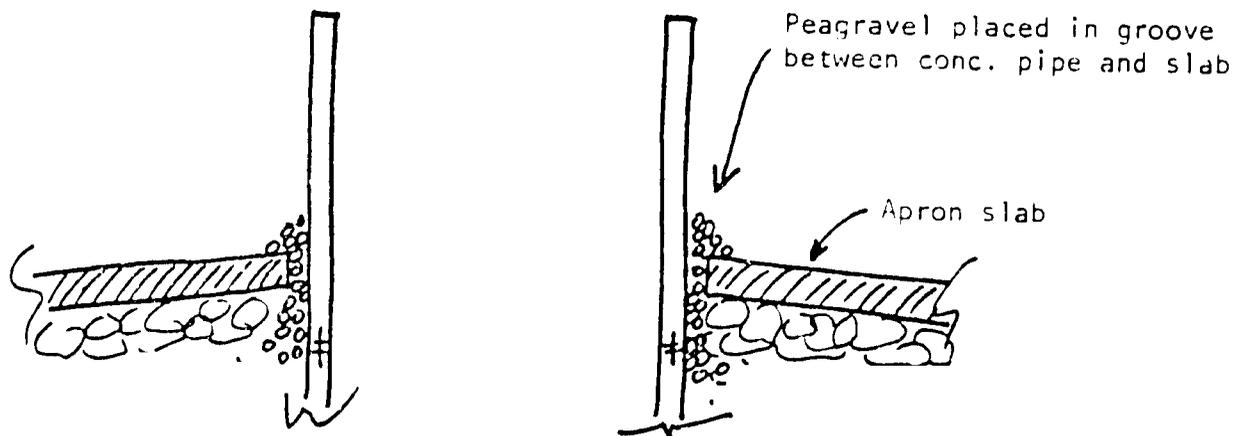
As the program expands, adding pipe sections at the different sites will become more complex because of the number of wells involved. An organized and equipped maintenance team must be on call to respond effectively as the needs arise. Not the least of the problems will be money. Costs for moving crews and material are relatively high, since they will constantly have to travel from site to site.

One way to reduce repeated deepening efforts (on an experimental basis, at first) is to lower a second set of properly perforated or screened culvert pipes inside the first so that they, eventually can settle, like a telescope, further into the water bearing strata.



This method has been successfully carried out in several Sahelian locations. Generally, however, heavier equipment has been used (mechanical cranes, orange-peel buckets, etc.) This second, slightly smaller set of pipes can be cast at ground level, near the well and lowered into the hole one by one, then tied or bolted together. Connections between the different sections must be sufficiently firm and permanent.

With or without this additional refinement, extreme care must be exercised to avoid jamming the uppermost segment at the ground surface by aprons or other portions of superstructure add-ons. Construction (and subsequent maintenance-) crews must make sure that the last section of pipe can settle into the hole just as freely as the lower ones. Placing a layer of peagravel between the sidewalls of the last pipe and the undisturbed soil may facilitate the gliding:



At several sites, we noticed unsanitary conditions in the immediate vicinity of the wells. Apron construction and maintenance must be improved wherever puddles occur:

- 1) A ringshaped slab of reinforced concrete should be constructed at all sites to provide a relatively maintenance-free and stable surface. Well grouted masonry pavement will also work.
- 2) Outside this first ring, a second ring consisting of rock and gravel should be placed and repaired or additional material added where needed. During construction, provide a pile of rocks and gravel which the well users - if properly instructed - can add themselves later, as need arises.
- 3) Make sure apron surfaces slope away from the wells at a rate of at least 2%.

The biggest problem is puddles of standing water. If an impervious surface with adequate slopes is provided, it could occasionally be washed off with a few extra buckets of water from the well. The major problem of water sanitation comes from the ropes which are alternately placed on the contaminated ground and subsequently lowered into the water.

#### Other observations on wall construction:

Increase concrete density: Considerable "honey-combing" has been observed on many inside well walls. This means that the freshly placed concrete has not been packed well enough. Low densities produce a structurally weak product. Increase efforts to get more compaction through additional pounding of the walls. Higher density can also be achieved by compacting with sticks or rods as concrete is being placed between the forms.

- 2) Oil the metal forms. We saw a few sets of molds where cement slurry had settled on the metal surfaces forming a cake that will resist good placement in subsequent pours. Surface irregularities not only prevent smooth settling but cause waste of material and result in undersized wall thickness.

#### Well covers for high water

A particular problem exists at several well sites (Gaigorou, Tahoua gardens, Telemces and others). Wide sections of the valleys where the wells are located, flood during or after heavy rains. Some water tables rise over the superstructure of the wells which subsequently fill up with not only water but debris, sand, gravel and clay.

Once the water has receded, the wells have to be cleaned out by hand.

To reduce the amount of deposit that otherwise would settle in these wells, a cover should be provided that allows water to enter freely but keeps out a substantial part of the sediments.

Such a cover could be put in place at the onset of the rainy seasons (when the wells are not in use anyway) and removed afterwards.

The cover should be relatively lightweight so it can be installed and removed easily by hand. At the same time, however, it must be sturdy enough to remain structurally stable to support people or animals that might step on it while the area is flooded.

Various locally available material may be considered. Corrugated metal sheets, old car-tops, etc., will do as long as they are placed on a metal or wooden frame that will support the various loads.

Any lightweight material would have to be tied down solidly to stakes or weights (rocks, old engine blocks, etc.) in order not to float away.

### GARDENING

Where more than a few small family gardens are involved, general development plans for each area should be established. A site plan should be developed showing systematic and rational development of the available soil and water resources around the ponds and in major river valleys.

Basics should include at least the following:

- extent of high and low watersurface
- extent of good garden soils
- existing gardens
- future gardens
- traditional wells (garden or "public")
- existing concrete lined wells (garden or "public")
- future well locations (garden or "public")
- access roads, tracks, major animal pathways currently existing
- access roads, tracks, major livestock "corridors" planned for the future
- areas of important existing vegetation (trees, bushes)

Such a layout can be done, if no other equipment is available, by running a hand-compass and pace traverse around the perimeter. For most of the project sites, aerial photography is available although some may not be very recent. The Forest Service's "Forest and Land Use Planning" office may be of some help locating existing maps and photos. The Ministry of Water is increasing efforts to catalogue all "mares" (ponds). Some of LWR's project sites may already be included in these surveys which are basically for the purpose of developing rational use plans.

"Planning" efforts should, from their onset, include village participation (especially the herders and gardeners). At each project site (especially where "mares" and large valleys are involved), perhaps "sand-box" type models could be constructed on a piece of plywood where the existing situation and, more importantly, future expansion could be modeled, discussed, changed and eventually agreed upon. With the help of such a visual aid, the people involved could probably see, understand and participate more actively in the orderly development of their resources.

#### Production of vegetable seeds

Demand for garden vegetable seeds in all of LWR's combined gardening projects will soon reach a level where the cost of purchasing imported seeds will become excessive. Eventually seeds of at least a portion of the garden-vegetables can be grown by the farmers themselves as they have done for years for some traditional crops. If the LWR garden projects would combine their efforts and interests with other garden projects (UNICEF, CARE), and

Save The Children/Upper Volta, a regular home-industry of seed production may become a viable private enterprise. Certain basic selection and breeding procedures could be included to improve garden produce even further.

Technically, however, quality seed production is not simple. A first introduction into this rather technical subject is included in the following letter-response from a reliable and technically qualified exPCV teaching at Rutgers.

DEPARTMENT OF HORTICULTURE AND FORESTRY  
 COOK COLLEGE  
 RUTGERS UNIVERSITY

April 22, 1961

Dear Mr. Weber:

You probably don't recognize my name but I remember yours from Peace Corps training (Niger '74). Well I've gone on to other things and am currently here at Rutgers instructing a Seed Multiplication Course designed for developing countries. So B. Pollack has asked me if I could send you some advice.

Well, your horse sense is correct, that is the way it used to be done and still can be done for many crops. You are also correct in your assumption that hybrids are not the best thing to get seeds from. Hybrids are produced by controlled crosses of two inbred lines which have been developed through many generations of self breeding and testing for combining ability -- ability to produce good hybrids with desired traits. Although hybrids do have advantages in many instances, perfectly satisfactory crops can be grown from open pollinated non hybrid seed which would be more feasible for the type of production you are talking about and might even be better for Upper Volta since they have a broader genetic base which gives them a wider range of adaptation and tolerance to adverse conditions, pests, etc.

The inbreeds used in hybrid production are generally controlled by seed companies (giving them a monopoly on their production and are often top secret so to speak -- neat huh!). Anyhow, seed taken from hybrids will usually show losses in yield up to 50% and will not breed true - will not show the characteristics which made them desirable. So hybrids are out at least until a seed operation gets pretty far off the ground. Anyhow, as I said, a number of good varieties of every vegetable are available and in most cases seed may easily be reproduced. Best varieties for your area can be identified through trial and error -- if it does well or not.

Now, down to the business of seed production and some of the things which have to be considered. First, it is generally easier to produce the seeds of crops which are normally grown for their fruits or seeds, since production of seed is very similar except that the fruits are generally allowed to ripen more than is generally desirable for a market crop. Included in this category are the following:

<u>beans</u>	harvest when pods dry
<u>corn</u>	harvest when husks of ears have dried down and grain is full
<u>cowpea</u>	as for bean, but shattering (release of seeds at maturity) may be a problem, so harvest must be done frequently as pods dry.

- cucumber harvest when fruits have turned golden yellow. Scoop out seeds. Clean by screening, with water to wash off pulp and other tissues. Dry seed immediately after washing. Sun and wind will dry seed spread on a screen, probably in a day or so.
- eggplant Let fruits become over mature for consumption; skin turns yellow. Slice open fruits, extract seed by screening in water. Good seed settles. Trash and bad seeds will float off. Several washings and screening may be needed for complete separation of trash and seed.
- lima bean as for beans, cowpeas
- okra let pods mature until grey green and woody. Crack open and take seed.
- pea like beans.
- pepper like eggplant, let fruits get fully mature (red ripe). All peppers turn red when fully mature. When fruit begins to shrivel slightly extract seeds.
- soybeans like beans
- summer squash let fruits mature. They will become huge, turn color, and develop a harder rind. May be 4 to 6 weeks after market harvest. Extract seed as for cucumers.
- muskmelons ripe when stem slips easily; comes off with slight pressure. Extract like cucumber seed.
- Watermelon (and other melons). Take seed when dead ripe. Let stem die if rot doesn't seem to be attacking the fruit. Extract like cucumber seed.
- Winter squash and pumpkins Harvest when fruits are fully mature, usually same as market harvest; you can let the vines die. Extract by scooping out the seed and washing.
- tomato As for pepper and eggplant, harvest dead ripe fruits, cut up and mix with water. Let ferment 24 to 36 hours stirring occasionally. Screen out seed, wash, and dry. Fermentation is necessary to kill bacterial diseases which may be present (bacterial canker, etc.) and to remove mucilaginous coating on seed that is impervious to water.

For those crops which are normally grown for vegetative parts, leaves, shoots, tubers, roots, etc., production is a bit more involved. Seed formation may take several months beyond the normal market harvest and certain environmental stimuli may be needed to initiate seed production. Usually an extended cold period of 6 weeks or more is needed at temperatures below 40-45° F and preferably closer to 32-35° F. This requirement is known as vernalization and is the case with most biennials.

beet* 40-50	leek* 45-50
swiss chard* 40-50	onion* 45-50
broccoli	parsley
brussel sprouts	parsnip
cabbage	rutabaga
cauliflower	turnip
carrot	salisify
celeriac	chicory
celery	endive
kale	collards
kohlrabi	

For crops marked with a star, relatively higher temperatures are effective in initiating seed formation. I know that onion seed can be produced in your area and beet and chard may be possible. Experiment; plant in fall to get maximum exposure to cold season. The others, however, may be difficult to impossible in your area. Again, you might want to experiment since these low temperature requirements vary from variety to variety and are genetically controlled and influenced by other factors such as daylength. You may be able to find types which can flower under your conditions; I am not so sure.

Daylength may pose a problem with certain crops such as onions, corn, soybeans, and others. Depending on the adaptation, they may never produce seed or may go to seed prematurely, when still small, producing few seeds. This will readily be picked up through observations of variety trials. In general varieties suited for use in the southern U.S. (Florida, Puerto Rico) will perform better if photoperiod is a problem. If varieties have been successfully grown for market this probably will not be too much of a problem since photoperiod would also affect the market crop. Examples would be onions which fail to bulb; 2 foot corn plants with one small ear. Such varieties would most likely be rejected already by growers.

Crops such as chinese cabbage, lettuce, radish, spinach, and mustard are annuals and do not have such requirements. They may easily be allowed to go to seed and the seed collected when pods have turned yellow and seed has turned color, black, brown, etc. Most of these shatter (drop their seeds at maturity) so harvest of individual pods would be most advisable for the small scale or else harvest the field when 10-20% of pods are yellowing; cut plants and dry on a clean mat or floor. Thresh out seed by beating or flailing with a stick (gently, make sure seed is not being pulverized) and then winnow out good seed from chaff. Local women will be experts at this. For small sets remove seeds from pod by rubbing between the palms of the hand, and winnow.

OK - 1st step - don't worry it gets more complicated. Besides knowing the climatic or environmental conditions needed for flowering it is also necessary to know how the crop is pollinated: if it is cross pollinated crossing can occur naturally causing genetic mixtures leading to deterioration of the type (variety that we are trying to produce). Such varieties must be produced under isolation at least 1/4 mile from any other variety of the same species to prevent unwanted crossing: ex red X white onions = ? boston X head lettuce = ? Isolation up to one mile in direction of prevailing winds or in flight of bees may be necessary. Cross pollination might be accomplished by wind or by insects, usually bees. Either wild or tame bees must be present for good seed set. If cross pollination is due to diecious nature of crop (male and female plants) males must be present to pollinate females (spinach, papaya, asparagus).

An additional consideration is that most cross-pollinated plants display serious reductions in vigour and yield if allowed to inbreed, either by self pollination or by pollination between closely related plants (brother-sister matings so to speak). The squashes are an exception and do not seem to be troubled by this problem. For the other cross-pollinated species though one must provide a fairly large population of plants (at least 100) to allow out crossing and prevent inbreeding depression by maintaining a wide genetic base, and giving wider adaptation to some extent. Therefore, select 100 plants or more for seed production, harvest seed, mix together in bulk to maintain gene base. More about selection later. I've included some photocopies which summarize some of this information. (Pollack - I have seen some farmers in Niger select only best stalks of corn for seed. This is bad because it could have been pollinated by a runt. In cross pollinated crops the use of synthetics is a good bet if you can get them. You can save seed from synthetics for 6 to 8 generations without loss of type.)

Self Pollinated Crops on the other hand normally pollinate themselves and are genetically pure lines (naturally homozygous). The upshot of this is that one may save the seeds of these crops and they will produce a plant that is true to the parent type without any need for isolation other than several feet to prevent physical mixtures of variety A and B, for example. These crops do not suffer from inbreeding depression so this need not be considered.

Some self pollinated crops show a limited amount of crossing depending upon conditions. These require a limited amount of isolation to prevent chance crossing, and variety contamination. Usually 100 to 200 feet is more than sufficient; interplanting a hedge or tall growing crop such as millet or sorghum between adjacent fields will lower the isolation distance required. See enclosure for listing of cross and self pollinators.

Selection of parent plants to be saved for seed production should of course be the best plants which are most representative of the desired varietal type. They should be evaluated on several factors including:

date of maturity

plant height, size

number of seeds

leaf type, size, shape, color

presence or absence of hairs, thorns, etc.

fruit size, shape, color, interior color

taste

flower color

In general, a number of physical traits which may be compared to the "type" plant. Any off-types differing in one or more of these traits should be

eliminated, preferably before pollination occurs. This procedure is known as roguing. Diseased plants should also be eliminated since many diseases are spread by seed.

Disease and weed control should be strict since a number of these problems can be spread by seed to infect the next crop.

rotations

use of good clean seed

sanitation

avoidance of spray irrigation

use of chemicals

Clean cultivation and many other techniques are available to control disease and weeds. Same as for market crops generally. Careful production of seed can eliminate many problems in future crops.

Irrigation Moisture stress during and after flowering can cause seeds to abort as can excessively high temperatures. Dry conditions are best for ripening and drying of seed.

Fertilization Similar to the market crop. Avoid excess nitrogen since this stimulates the growth of the vegetation at the expense of seed production. Slightly higher P and K will favor seed production.

Insects Should be controlled as they can reduce production and reduce seed viability by feeding on the embryo. Insects such as weevils can cause storage problems and should be controlled also.

Storage Seed varies in the length of time it may be stored, from one to five or more years. This data is summarized in the enclosures.

Cool and Dry is the key since organisms (fungi and insects) which attack the seed need warm humid conditions to flourish. In general seed should be dried to 12% moisture content or less. This should be easily accomplished by exposing seed to the ambient air during the dry season for several days; even seed which seems dry should be dried in this manner. Direct sun should be avoided since high temperatures can kill the seed.

So here it is in a nutshell. You should be able to do a good job for many species. The warm dry climate of Upper Volta should be very favorable since this type of climate is best for seed production. It eliminates a lot of disease problems which require humidity and favors maturity and drying of the seed. This is the main reason that U.S. seed production is centered in the arid western states.

You cannot repeat this procedure indefinitely; the quality of the seed may begin to deteriorate genetically due to small population size, crossing, mutation, etc. Stocks should be reviewed every 2 to 3 years or so. Again,

experiment. Quality standards in Upper Volta are not as strict as here. Are there any seed laws? They might regulate these activities, distribution, labeling, etc.

A good book is Rogers, Marc. Growing and Saving Vegetable Seed. Garden Way Publishing, Charlotte, Vermont. 1970. Good basic material designed for the layman gardener.

Mavthorn, Leslie and Pollard, Leonard. Vegetable and Flower Seed Production. Blakiston Co., Inc. New York. 1954. Very good but a bit technical. Also may be hard to find.

Seed 1961 Yearbook of Agriculture. A good background book which broadly covers many aspects of seed production.

Well I guess that's about the lowdown in brief. I've reams of stuff here so don't hesitate to call if you need more information or clarification as I'm always glad to aid volunteers and have a strong interest in agricultural development, especially in Africa. Good luck.

Sincerely,



Gene McAvoys, Assistant Instructor  
Dept. of Horticulture and Forestry

# Seed M. ult Systems

## Table of Information

Vegetable	Page	Life Cycle for Seeds	Seed Viability (Years)	How Pollinated	Need Isolation
Asparagus	49	Perennial	3	Insect	Yes
Bean	89	Annual	3	Self	Limited
Beet	59	Biennial	4	Wind	Yes
Broccoli	71	Annual	5	Insect	Yes
Brussels Sprouts	72	Biennial	5	Insect	Yes
Cabbage	66	Biennial	5	Insect	Yes
Carrot	95	Biennial	3	Insect	Yes
Cauliflower	72	Biennial	5	Insect	Yes
Celery	100	Biennial	5	Insect	Yes
Celery	100	Biennial	5	Insect	Yes
Chinese Cabbage	73	Annual	5	Insect	Yes
Chive	49	Perennial	2	Insect	Yes
Corn	45	Annual	1-2	Wind	Yes
Cowpea	92	Annual	3	Self	Limited
Cucumber	117	Annual	5	Insect	Yes
Eggplant	103	Annual	5	Self	Limited
Garlic	51	Annual		See listing	No
Horseradish	80	Perennial		See listing	No
Jerusalem Artichoke	124	Perennial		See listing	No
Kale	75	Biennial	5	Insect	Yes
Kohlrabi	76	Biennial	5	Insect	Yes
Leek	52	Biennial	3	Insect	Yes
Lettuce	122	Annual	5	Self	Limited

Vegetable	Page	Life Cycle for Seeds	Seed Viability (Years)	How Pollinated	Need Isolation
Lima Bean	91	Annual	3	Self	Limited
Muskmelon	121	Annual	5	Insect	Yes
New Zealand Spinach	65	Annual	5	Wind	Yes
Okra	93	Annual	2	Self	No
Onion	53	Biennial	1-2	Insect	Yes
Parsley	101	Biennial	2	Insect	Yes
Parsnip	102	Biennial	1-2	Insect	Yes
Pea	86	Annual	3	Self	Limited
Pepper	106	Annual	4	Self	Limited
Popcorn	48	Annual	1-2	Wind	Yes
Potato	109	Annual		Self	No
Pumpkin	116	Annual	5	Insect	Yes
Radish	81	Annual	5	Insect	Yes
Rhubarb	56	Perennial		See listing	No
Rutabaga	79	Biennial	5	Insect	Yes
Salsify	126	Biennial	2	Self	No
Soybean	92	Annual	3	Self	Limited
Spinach	62	Annual	5	Wind	Yes
Squash, Summer	111	Annual	5	Insect	Yes
Squash, Winter	111	Annual	5	Insect	Yes
Swiss Chard	62	Biennial	4	Wind	Yes
Tomato	107	Annual	4	Self	Limited
Turnip	78	Annual	5	Insect	Yes
Watermelon	121	Annual	5	Insect	Yes

**VEGETABLE CROPS NEEDING EXPOSURE TO COOL WEATHER IN ORDER TO PRODUCE SEEDSTALKS**

Generally, the biennial vegetables listed below should be partly developed before they are exposed to cold. Those that are too small may not be greatly affected by the cold; cabbage stems, for example, should be at least as large as a lead pencil in diameter. The average chilling temperature should be below 45°F, and the chilling should continue for 1-2 months. Cooler temperatures may shorten the period of exposure. In seed production it is important to obtain close to 100% of the plants developing seedstalks, every effort should therefore be made to have them large enough to react to the cold stimulus.

Beet	Kohlrabi
Brussels sprouts	Leek
Cabbage	Onion
Carrot	Parsley
Celeriac	Parsnip
Celery	Radish, winter type
Chard, Swiss	Rutabaga
Collard	Salsify
Florence fennel	Turnip
Kale	

**DESIRABLE ISOLATION DISTANCES BETWEEN PLANTINGS OF VEGETABLES FOR SEED PRODUCTION**

*Self Pollinated Vegetables*

Self-pollinated crops show little outcrossing. Consequently, the only isolation necessary is to have plantings spaced far enough apart to prevent mechanical mixture at planting or harvest. Seedsmen often plant a tall growing crop between different varieties. Canada requires 150 ft of separation for stock seed sources of most self-pollinated crops.

Bean	Bean, Lima	Chicory	Endive
Lettuce	Pea	Tomato	

*Vegetables Pollinated by Airborne Pollen*

One mile between varieties is recommended:

Beet	Spinach
Corn	Swiss chard

*Vegetables Pollinated by Insect-Borne Pollen*

Allow at least 1/4 mile between plantings and avoid having fields of several varieties of the same species or group planted in the line of flight of wild or domestic bees to a colony. Isolation of 1 mile is necessary in some cases.

Asparagus	Celery	Melon group:
Cabbage group:	Cucumber	Casaba
Broccoli	Eggplant	Crenshaw
Brussels sprouts	Gherkin	Honeydew
Cabbage	Miscellaneous Brassica group:	Muskmelon
Cauliflower		Chinese cabbage
Collard	Mustard	Watermelon
Kale	Radish	Onion
Kohlrabi	Rutabaga	Parsley
Carrot	Turnip	Peppers
Celeriac		Pumpkin
		Squash

	Average U.S. Yields, 1976-1977 (lb/acre)	Very Good Yield (lb/acre)
Pumpkin	534	800
Radish	982	2000
Rutabaga	2000	2500
Salsify	300	1000
Southern pea	—	1500
Spinach	1560	2500
Squash, summer	640	1000
Squash, winter	404	800
Tomato	121	200
Turnip	1380	2000
Watermelon	251	400

U.S. yields adapted from Vegetable Crop Reporting Board ESCS, USDA (1978).

Both high moisture and high temperature will cause rapid deterioration in the viability of vegetable seeds. The longer seeds are held, the more important becomes the control of the moisture and temperature conditions. Low moisture in the seeds means longer life, especially if they must be held at warm temperatures. Kinds of seeds vary in their responses to humidity (page 335).

The moisture content of seeds can be lowered by drying them in moving air at 120°F. This may be injurious to seeds with an initial moisture content of 25-40%. With such seeds 110°F is better. It may take less than 1 hour to reduce sufficiently the moisture content of small seeds or up to 3 hours for large seeds. This will depend on the depth of the layer of seeds, the volume of air, dryness of air, and original moisture content of seed. When you cannot dry seeds in this way, seal them in airtight containers over, but not touching, some calcium chloride. Use enough of the chemical so that the moisture absorbed from the seeds will produce no visible change in the calcium chloride. Dried silica gel can be used in place of the calcium chloride.

Bean and okra may develop hard seeds if their moisture content is lowered to 7% or below. White seeded beans are likely to become hard if the moisture content is reduced to about 10%. Dark colored beans can be dried to less than 10% moisture before they become hard. Hard seeds will not germinate satisfactorily.

The moisture content of seed will reach an equilibrium with the atmosphere after a period of time. This takes about 3 weeks for small seeds and 3-6 weeks for large seeds.

Storage temperatures near 32°F are not necessary. Between 40 and 50°F is quite satisfactory when the moisture content of the seed is low.

If you reduce the moisture content to 4-5% and put the seeds in sealed containers, you can use a storage temperature of about 70°F for more than 1 year.

This letter has been transmitted to the Save the Children staff in Upper Volta who could share experiences and compare notes with LWR's gardening efforts in Niger. As a first step, LWR/NY could perhaps contact the STC office in Westport (Judy Obermeier) to arrange further exchange of information and perhaps arrange across the border visits of project staffs (Jack Blanks, Dori).

A few other observations:

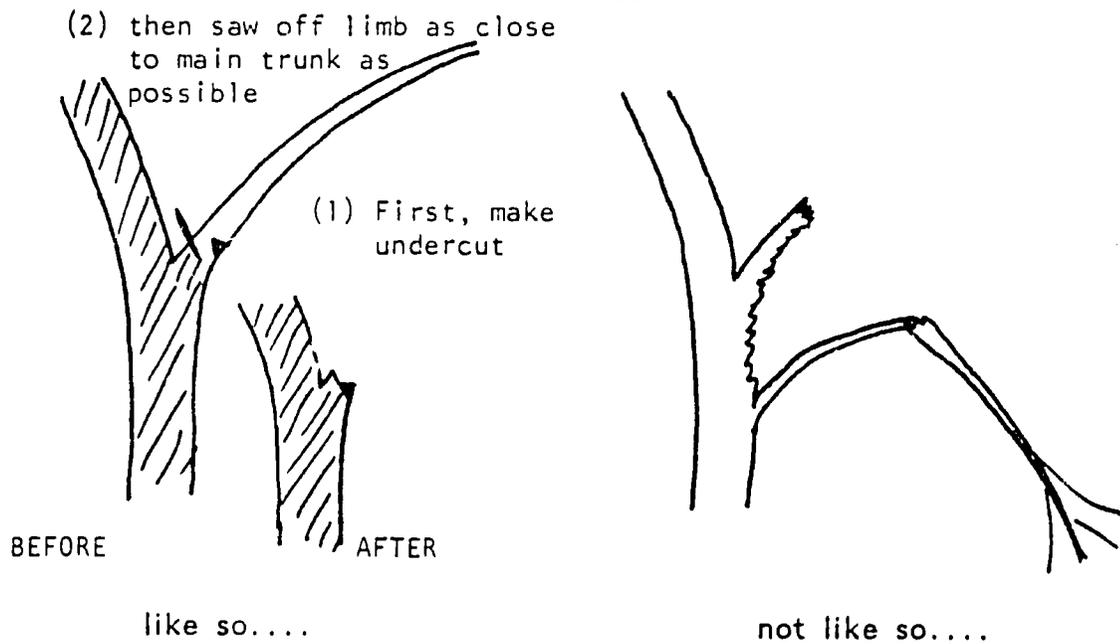
- 1) Water lifting: The subject of replacing the hand-operated rope and bucket system has been raised during our visit at several sites; in one instance a local farmer thought perhaps a gasoline operated lo-head pump may be cheaper than paying wages to laborers. We think more appropriate "inbetween" solutions such as the Chadouf should be tried. Developed in the Neareast thousands of years ago and used elsewhere in Niger, the Chadouf takes advantage of using human power more effectively than vertically raising a given weight on a rope by hand. A big counter-balanced lever-arm brings the full bucket up much more easily. Power is required to pull the arm back down, but it is much easier for a person to pull a given weight down than it is to pull the same weight up.

Other basic, low head technologies can be tried at various stages such as animal traction used in the double dalloul, or a simple rope and pulley with a donkey alternating back and forth.

- 2) Land leveling: In some areas the garden surfaces could or should be leveled more uniformly. Especially where furrow (gravitation) irrigation of small areas is practiced, more even leveling would reduce water losses and increase effective use of available land and soil. This can be done by hand using nothing more than some boards of lumber to scrape and grade. The important element is proper staking of the final elevations including a general, gentle slope. Elevations of the surfaces of the beds also must be properly coordinated with the flowliness of the ditches. Expensive level-instruments can be substituted by two sticks and 50' of clear plastic garden hose.

### FORESTRY AND TREES

As mentioned in the main part of the report, the biggest problem is proper maintenance and trimming of live-fences. The Forest Service must make deliberate efforts to permit people to prune (effectively) and to show them how. A caveat at the onset: the best possible tool for cutting larger branches are (pruning-) saws, not machettes. A branch must be cut off properly, otherwise the tree is seriously damaged. Badly made machette-cuts result in mutilated stubs that coppice badly, leave much more room for insects (including termites) to attack and when the limb finally falls off it may take with it a slab of bark from the main stem. This can be prevented if done properly with a saw:



Trim the hedges relatively early: as soon as the first branches are 1 m beyond the desired dimensions. (Do not wait til the whole hedge has grown into a full size tree-wall!)

Tall trees of species chosen by residents may be planted at regular intervals (about 3 to 5 m apart). This would result in a live-fence/windbreak row that would serve a double purpose. Livefences around individual fields are desirable, but we do not advocate complete windbreaks for each individual 1/4 ha garden plot. Major wind direction (which may vary according to seasons) is one factor in the overall design and planning is the key.

Food trees: We noticed with interest the relative abundance of *Moringa oleifera* in many of the gardens, even in those freshly started. This desirable tree furnishes tender leaves used in local sauces and stews and is just one of the many more or less native tree species that are very much appreciated as a valuable source of food. Perhaps these food trees can be

incorporated into fence rows (and windbreaks). With some imaginative experimenting (relying heavily on guidance from local gardeners), a great deal can be done to combine native trees providing valuable food supplements with gardening activities.

Fruit trees: Mangoes, citrus and other fruit trees are very much in demand. The Tahoua fruit tree nursery could provide many varieties of fruit trees that may readily spread into the various gardening project sites. However, while vegetable gardens are seasonal and fencing is only required part of the year, fruit trees need year-round protection. This means that gardens located along ponds must be fenced on four sides. This goes beyond the traditional method of fencing three sides with the fourth being temporarily protected by water. The water recedes during dry portions of the year, leaving the garden unprotected along that side. Also, during the first years these fruit trees may need supplemental irrigation during the dry season; which means gardeners would have to stay near their villages practically all year long. This requirement should be fully explained and understood before gardeners are given tree seedlings.

We also have been asked about date palms. They undoubtedly will grow at most LWR garden sites, however, the only reasonable yields so far have been obtained further North (Agades and InGall). This question could be checked out with the Agriculture Services. Shoots from date palms are better than starting them from seeds. In the long run dates may become the most valuable "garden crop" of all.

## ANNEX C METHODOLOGY

The objectives of this study are several. For some of the LWR/Niger projects it is an end-of-project evaluation, for others a mid-point or feedback monitoring. LWR/NY also asked that the evaluators study policy questions of the application, the effectiveness, and the impacts of LWR and AID/Matching Grant objectives, and evaluate environmental impacts by using the Ecologic Guidelines compiled by CODEL. It was further hoped that the data collected and the methodology used would be helpful in evaluating LWR projects in other countries in a comparative as well as an absolute manner.

With all these various objectives in mind, the evaluators developed a flexible and informal methodology but used several instruments which would be helpful in collecting, recording, and comparing information.

The first (attached) is a simple project face sheet giving a summation of basic documentation about each project. The information for this sheet was compiled from project documents found in LWR/NY, LWR/Niger, and in various project offices.

The second (also attached) is a project data collection document. The evaluators, one a social scientist (anthropologist) and one a technical scientist (forester/engineer) conducted open ended interviews together and separately. They interviewed LWR staff (American and Nigerien), GON field agents and officials, project personnel, and local residents, both those involved and those not or not yet involved in the projects. They kept in mind the total information required but took special care to cover his/her field of expertise. Each interviewer compiled individual daily fieldnotes. From their combined

notes they completed the data collection document discussing each point and either reaching a consensus or noting various aspects presented by the projects.

Finally, working directly with the stated LWR and the Matching Grant objectives, the ecologic guidelines, and adding one column for significance in relation to size of area gardened or number of people affected, etc., and a column for intrinsic value in relation to the priority needs of the population, the evaluators made a chart upon which projects received high, medium or low ratings for each point. From this chart it is evident how each project ranked on each of the 24 criteria.

For the purposes of the end-of-project and mid-term evaluations each project was described as to its history and context, its current status, its impacts and potentials, lessons which had been learned specific to that project, and recommendations for LWR.

For the purposes of policy evaluation, the evaluators examined each of the stated objectives pointing out not only how well they had been met, but the fact that all these objectives cannot be met equally well in all projects in all environments. Some criteria are more relevant at certain levels of development than others.

For the purposes of evaluations in other countries, the methods of interviewing and approaching people and government officials will require entirely different approaches. However, since the LWR and Matching Grant objectives and the Ecologic Guideline Criteria are constant, the use of the objectives chart would appear to be applicable in all cases. The data

collection documents would also help assure a framework useful in formulating the information collected in a comparable manner to illustrate similarities and differences.

PROJECT FACE SHEET

Project Title:

Dates:

LWR Budget:

Participants:

Activities:

Status:

Recommendations:

	LWR OBJECTIVES								MATCHING GRANT OBJECTIVE		SOW		OTHER		Environmental impacts per "mini-guidelines"								
	1	2/3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Idea originate with target group	Serve poorest majority	Stimulation of local and national organizations	Accent on local, natural and human resources	How well can activities become self-supporting?	Technical soundness	How much is project part of overall program?	Periodic review & evaluation by LWR	Stimulate communities own development	Support infrastructure network	Assist government project management capability	Adequacy of LWR staff support	Applicability of credit-financing	How replicable are project efforts?	Significance of effort (size, number of people involved, etc.)	Priority in term of local needs, perceived values, urgency, etc.)	Physical environment-soil, water, natural vegetation	Health	Economics (local)	Socio-political factors (stability)	Cultural	Administration, government agencies	Energy
Filingue wells •																							
Bavona gardens •																							
Tillabéri marcs • Thon																							
Gaigorou																							
Tanguetmane •																							
Tolences •																							
Tahoua fruit tree nursery •																							
Tahoua gardens •																							
Gaya																							

H = positive impact  
 0 = no impact  
 L = negative

CHART: PROJECT PERFORMANCE BY INDIVIDUAL OBJECTIVES

## QUESTIONS FROM PROJECT DATA COLLECTION DOCUMENT

### QUESTIONS ASKED OF LOCAL POPULATION

1. What did they do before the project?
2. Who originated the idea? How was it received? Was it a priority activity?
3. How was the activity organized (first and now)?
4. Who contributed what (labor, material) (first and now), (donor, local agents, residents, other) (identify and quantify)?
5. If there is training etc. who selected the people to be trained, how useful is the training? Who was trained? What % of the community was trained?
6. Who receives benefits? (Quantify benefit amount and number of beneficiaries)
7. How do locals perceive activity is working? (Technically, timely inputs, results)
8. Has it resulted in what locals expected?
9. Would they like to see a change (or if it were started in a similar community how could it be made better)?
10. What do they see as future chances for project to continue or to grow? How do they believe it might change?

### DESCRIPTION OF THE CONTEXT

11. Why was this site chosen for the project? Is it a priority area?
12. Describe relation of rich vs poor farmers and if possible identify institutional support for this division (ethnie, religion, heritage, education, etc).
13. Participants vs nonparticipants (minimum profile)
14. Local conflicts or differences that impact on project activities or benefit equity (political, social class, sex etc.)
15. Project in relation to overall basic needs and priorities.

AGENCY, GOVERNMENT ORGANIZATION OR LOCAL LEADER RELATING TO PROJECT SUPPORT (In Niger this level of questioning was appropriate to ask GON service agents and project managers. In other countries supportive church officials or a village spokesman/woman active in organizing support for the activity might be more appropriate).

16. Identify who has been involved (find the following from the various perspectives if there are several)
17. What role did each play in project support?
18. Are roles changing (or have they changed)?
19. How has this project affected other activities?
20. How have locals responded to this support person (group)? How has LWR responded?
21. Have technical changes been made in the project? Were they responsive?
22. What changes in the community have been noted in relation to the project--more activities, more organization, more information or training, "better-off" etc.?
23. What is seen as the future chances for the project to continue, or to grow?
24. How could the project be made better? Should it have been started differently?

#### LWR LOCAL STAFF

25. How have local residents reacted? Have they been supportive? Have they changed because of the project? If so, how?
26. Has there been government support or interference (originally or now)?
27. Is there local capability to support project? Has this changed? What will happen when funding from LWR ceases?
28. How has support been from LWR/NY? How could LWR/NY make your work easier?
29. How could the program (projects) be improved?

30. Do you believe that any of the LWR activities could or would in the near future be run on a private basis or with loans?