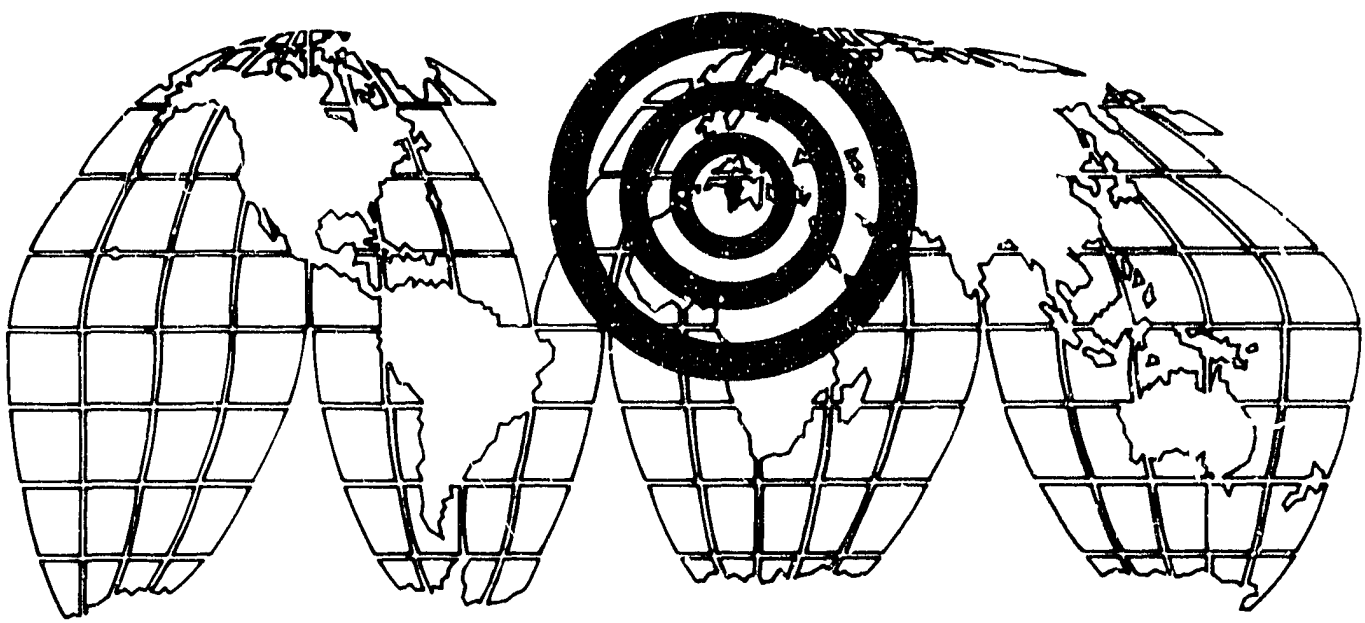
A.I.D. Project Impact Evaluation Report No. 10

Tunisia: CARE Water Projects



October 1980

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TUNISIA: CARE WATER PROJECTS

PROJECT IMPACT EVALUATION NO. 10

by

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EXECUTIVE SUMMARY

Overview: Over the period 1975-1979, four water projects were implemented by CARE for $1.9 million ($881,000 from A.I.D., $188,000 Peace Corps, $86,000 CARE, and $771,000 from Tunisian national and local budgets). To reach goals of improved health and quality of life for rural Tunisians living in the provinces of Bizerte, El Kef, Kairouan and Siliana, these projects had three basic purposes: (a) to make potable water available by renovating and enclosing about 300 existing wells and springs; (b) to institutionalize a maintenance and disinfection system at the provincial level; and (c) to increase health awareness among beneficiaries. Some one to five years after project completion: (a) 325 water sources have been renovated and are used by about 100,000 rural Tunisians, although there is minimal change in available potable water; (b) maintenance/disinfection teams have been established in all four provinces, but they are not operating very effectively; and (c) three of four health education teams formed by the projects still exist, but there appears to be little or no change in health awareness.

Project Implementation: The projects were implemented by CARE based on contracts signed with the Government of Tunisia. They were done in cooperation with United States Peace Corps volunteers, the national Ministry of Public Health and the four provincial governments. CARE initiated and designed the projects, arranged funding, and selected sites from lists which were developed by provincial authorities in consultation with local leaders. Major site selection criteria were technical feasibility and number of users. There was no significant local participation in project design, implementation or maintenance. The projects were designed to improve water quality; they were not designed to tap new sources of water or increase existing supply. Sites were renovated and reconstructed over a 12-18 month period in each project area, with some site improvements being done in as little as two weeks. Almost half of the 325 improved sites were shallow hand-dug wells, used since Roman times in some cases; 25 were deep wells in drier Kairouan; and the remaining two-fifths of the sites were springs. The project sites were rehabilitated and enclosed to control water contamination with relatively low-cost technology that required minimal maintenance.

Evaluation Sample: The evaluation team visited 31 project sites in three weeks. The sample was selected randomly, stratified by type of water point (well or spring) and by geographical distribution among districts within each province. Four non-project sites were also visited. Interviews were conducted in Arabic with men and women users at 30 project and four non-project sites. All sites are in rural, often remote areas and usually serve dispersed settlements of people who subsist on farming and/or grazing.

Impact on Availability and Use of Potable Water: Based on Ministry of Public Health records, about three-fourths of the project sites were not producing water that was potable by Tunisian public health standards. About four-fifths of the project sites visited needed repairs of some kind.

Only about half of this same sample were closed systems, that is, were fully operational and showed no sign of damage that could permit surface contamination. At nearly two-fifths of the sites where handpumps had been installed, they were not working. The diesel pumps used in Kairouan were operating at all five sites visited.

Impact on Health and Quality of Life: The evaluation was not able to demonstrate a relationship between a change in the incidence of water-related disease and the CARE water projects. Generally, water use patterns were not altered by the projects, and there was no increase in water supply intended. There is an estimated average of 300 users per improved site per day, but the Kairouan deep wells were averaging 1,200. Water consumption averaged ten liters per capita per day (lcd), ranging from 5-25 lcd. Some of the project sites may have had negative impact where users discontinued their own disinfection practices because they thought the water was safe, but where in fact the water may have been contaminated because project treatment had ceased. Among positive impacts, women usually preferred pumps to buckets, and covered wells have decreased the danger of small children falling in.

Impact on Participation: Beneficiary participation was on the whole very limited. It varied from one project area to another, however, depending on the critical need for water. Participation was greatest in the driest project area, Kairouan, where users have created a system of fees to cover diesel fuel costs. This participation was associated with better site maintenance at Kairouan. Participation was virtually nonexistent in the somewhat better rain-fed areas of Bizerte and El Kef where alternative water sources were available.

Impact on Institutions: The projects sought to institutionalize maintenance, disinfection and health components. As planned seven mobile maintenance/disinfection teams and four health education teams were trained and turned over to the provincial governments by CARE. All but one of these teams still exist. Based on interviews at 30 sites, only five sites had been visited by a maintenance team within the preceding month; only eight sites had been disinfected within the preceding two weeks, and only two sites had been visited by health educators within the preceding month. Although the projects had some impact on Tunisian institutions, they are not coping with the problems as well as had been hoped.

Conclusions and Issues of Current Projects: Although the water projects were aimed at the rural poor and were implemented basically as planned, they were not successful in making available consistently potable water. Furthermore, health benefits cannot be expected from potable water projects if water quality is not improved. The projects were prepackaged and local participation was minimal; and they did not address the major apparent user perceived needs of greater access and more water. For the projects to produce consistently potable water, Tunisians must pay immediate attention to maintenance, disinfection problems and health education.

Lessons Learned: Where the host governments are unwilling or unable to operate systems to provide water that meets all standards of potability, A.I.D. should fund projects that increase quantity, dependability, and accessibility and that provide water of better quality than would otherwise be available. Water potability should be viewed in relative not absolute terms. Project design should reflect demonstrated community need rather than prepackaged donor solutions. Local participation might have been greater if beneficiaries had collaborated in the planning. There are opportunities for future Tunisian-American cooperation in water projects, but the working relationship needs to be strengthened, including agreement on a long-term public health strategy, experimentation with alternative technologies, and collaborative evaluation.

FOREWORD

In October 1979, the Administrator of the Agency for International Development requested that, in preparation for an Agency-wide ex post evaluation system, between twenty and thirty projects be evaluated during the subsequent year, focusing on the impact of these projects in several representative sectors of the Agency's program. These impact evaluations are to be performed by Agency personnel and result in a series of studies which, by virtue of their comparability in scope, will ensure cumulative findings of use to the Agency and the larger development community. This study of the impact of Tunisia: CARE Water Projects was undertaken as part of this effort. A final evaluation report will summarize and analyze the results of all the studies in each sector, and relate them to program, policy and design requirements.

PREFACE

The evaluation team wishes to acknowledge the contributions of a number of people. We received outstanding cooperation and support from Bill Gelabert, USAID/Tunisia Mission Director and his staff, and from Tim Aston, CARE-Tunisia Country Director and his staff. We extend our special thanks to Dorothy Young of USAID and Michele Blais of CARE in Tunis for their help. We would like to thank the CARE staffs in New York, especially Joseph Steele, and in Tunis, for making available team members Brian Cavanagh, CARE/Haiti, and Karl Manzer, CARE/Tunisia, and for providing two four-wheel drive vehicles which were essential to reach many of the sites visited. Thanks go to Patrick Dumont, Peace Corps Director in Tunisia, for permitting Peace Corps volunteer Carol Bohumolski to join the team.

We acknowledge the generous assistance of personnel of the Ministry of Public Health and the Genie Rural of the Ministry of Agriculture. Of course, we are indebted to the many Tunisians we met in rural areas who were so generous with their information and hospitality. We hope that our efforts will ultimately serve a useful purpose on their behalf.

PROJECT DATA SHEET

1. Country: Tunisia

2. Project Numbers and Titles:

   a. 664-0286 Bizerte Wells
   b. 664-0288 El Kef Wells Rehabilitation
   c. 664-0298 Kairouan Water Facilities
   d. 664-0299 Siliana Water Improvement

3. Project Implementation:

a. First Project Agreement	FY 1975
b. Final Obligation of Funds	FY 1978
c. Final Inputs Delivered	FY 1979
d. Project Completion	FY 1979

4. Mode of Implementation:

   a. Grant agreements between AID/NESA and CARE Headquarters in New York City

   b. Implemented by CARE/MEDICO - Tunisia based on contracts signed between CARE/MEDICO-Tunisia and the Government of Tunisia

   c. Done in cooperation with the United States Peace Corps in Tunisia, the Ministry of Public Health of the Government of Tunisia and the respective governorates in Bizerte, El Kef, Kairouan and Siliana

5. Project Funding (Approximate totals for all projects in 000 U.S. $)*

a. AID	881
b. CARE	86
c. Tunisian Ministry of Public Health	415
d. Governorates	356
e. Peace Corps Volunteers (value)	188
	1,926

*Detailed breakout is found in Appendix D of the report.

6. Previous Evaluations

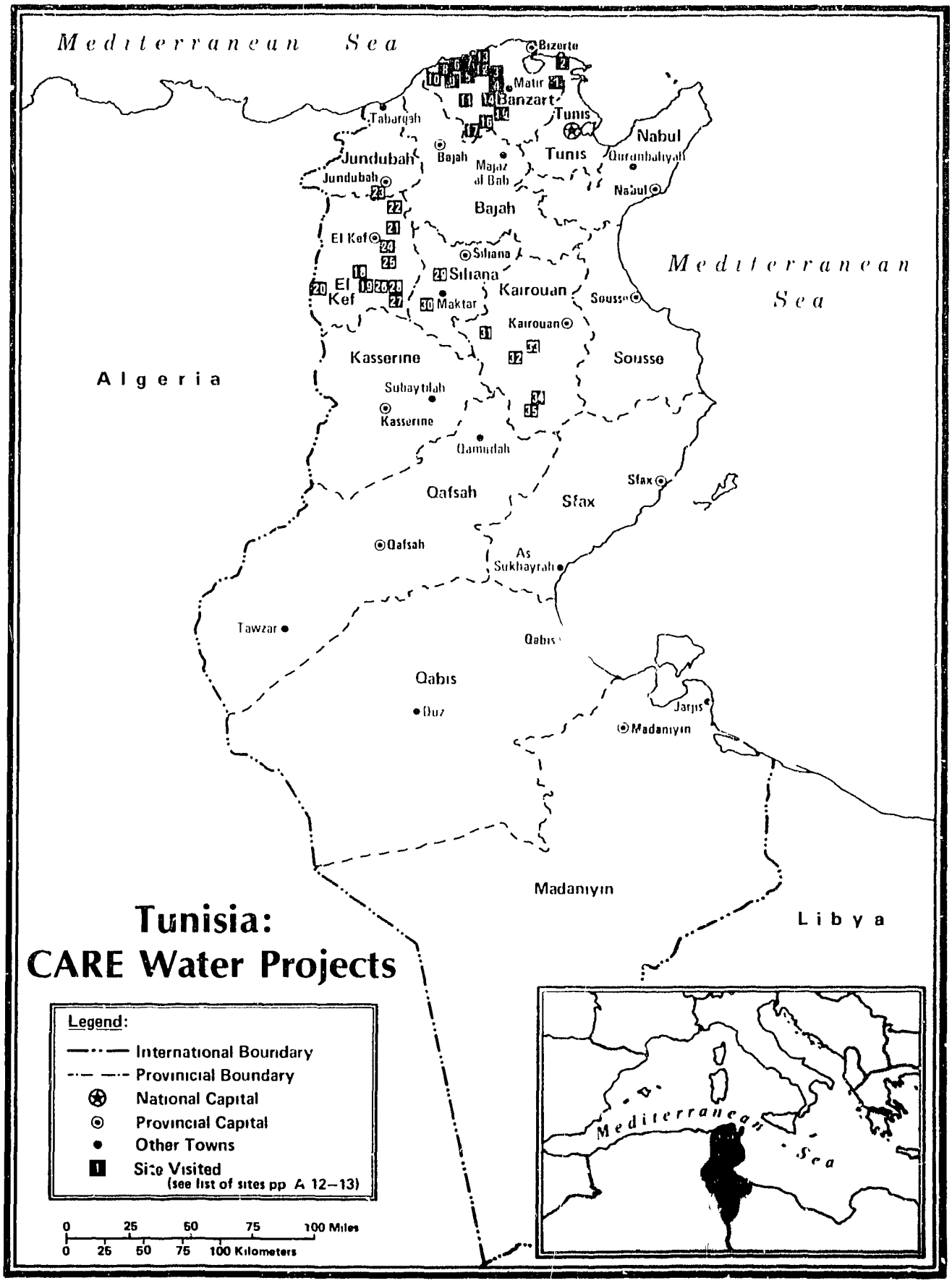
   a. Brush, Richard and Roark, Philip, Technical Analysis of Tunisian Potable Water, Louis Berger International, Inc., a report to AID, November 13, 1978.

b. Cavanagh, Brian J., Oppen, Mark, and Lynch, Michael, Bizerte Wells Project Evaluation, CARE report, June 1977.
c. McJunkin, F. Eugene, Rural Water Supply and Sanitation Programs Assisted by the United States Agency of International Development (USAID), a report to the Division of International Health Programs, American Public Health Association, May 4, 1976.
d. Swanson, Louis Jr., The Le Kef 240 Wells Project Evaluation, a report by a Peace Corps Volunteer working in the project, undated (ca. 1974). Evaluation of an earlier related project.

7. Other Relevant Reports/Evaluations:

a. Ayad, Carole Steere, Social Soundness Analysis of Potable Water Interventions in the Central Tunisia Rural Development Project Zone, a report to USAID/Tunisia, August, 1978.
b. Dommen, Arthur J., Rural Development (Project 0285 and Adjunct Projects) Final Report, an AID agricultural economist's final report, September, 1979.
c. Haratani, Joseph, Trip Report: Tunisia, April 1979.
d. Popper, Roger and McKee, Tom, Evaluation of USAID/Tunisia's Siliana Rural Development Project, and the Save the Children Foundation (sic) Project, a report to USAID/Tunisia by Practical Concepts, Inc. October, 1979.

8. Rate of Exchange: throughout the period of the projects the rate was fairly stable at about U.S. $1.00 = TD 0.400, or U.S. $2.50 = TD 1,000.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Tunis
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Jundubah
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Majaz al Bab
Tunis
Qurunbaliyah
Nabul
Jundubah
Bajah
El Kef
Siliana
Siliana
Kairouan
Sousse
El Kef
Maktar
Kairouan
Kasserine
Sousse
Algeria
Subaytilah
Kasserine
Qamudah
Sfax
Qafsah
Sfax
Qafsah
As Sukhayrah
Tawzar
Qabis
Qabis
Jarjis
Madaniyin
Duz
Madaniyin
Libya
Mediterranean Sea
Tunisia:
CARE Water Projects
Legend:
International Boundary
Provincial Boundary
National Capital
Provincial Capital
Other Towns
Site Visited
(see list of sites pp A 12–13)
0 25 50 75 100 Miles
0 25 50 75 100 Kilometers

I. INTRODUCTION

In the subtropical, dry lands south of the Mediterranean Sea, some 100,000 Tunisians living in dispersed rural settlements are using wells and springs that have been improved with American assistance. In this once verdant "bread basket" of the Roman Empire, some 600 existing wells and springs in remote areas of Tunisia have been renovated by CARE, the Cooperative for American Relief Everywhere, Inc., a private and voluntary organization based in New York, with partial funding by the Agency for International Development (A.I.D.) and assistance from Peace Corps, Tunisia. Of these water projects, about half were completed in the past five years, and these form the focus of this evaluation. See Appendix A for the methodology used.

Water is life for Tunisians, as it is for people the world over. The World Health Organization considers the provision of safe and convenient water supply to be the single most important activity that can be undertaken to improve the health of people living in rural areas. The United Nations has declared the period 1981-1990 to be the Drinking Water Decade, and A.I.D. has indicated its intention to continue assistance in this sector.

II. THE PROBLEM AND THE PROJECT

Many rural Tunisians lack a clean and convenient water supply. In the drier regions many are forced to walk several miles to draw water, often from unprotected wells, springs or river beds. The principal drawers of water are women and children who fill clay jars called goolas or gargoulettes, or plastic containers called bidoons. Tens or even hundreds of families make demands on the same sources. Water becomes very scarce during the summer dry season.

Woman with gargoulette of water in Kairouan

In recent years, the water supply has been adversely affected by the drought. Thus, the normally limited availability of drinking water in several areas

has been even further reduced. Rainfall in central Tunisia, which averages only between 10-20 inches per year, may have declined about 25 percent over the past two years. Tunisians say water levels and flows of springs have gone down. Much of the last decade has been drier than the previous 50 years of record

Because animals use the same sources or because human sanitation is inadequate, the water is often fecally contaminated. This represents a considerable health hazard, especially for the more vulnerable infants For Tunisia as a whole, as many as 10 percent or more of infants die before their second birthday. The percentage may be higher in rural areas. Public health officials believe that if the water were made cleaner, that within a short period there would be a dramatic decrease in infant mortality and the incidence of water-related diseases, such as typhoid fever, cholera, amoebic dysentery and shigellosis. However, generally Tunisians do not perceive water contamination to be a problem.

Most rural Tunisians subsist on dryland farming or by mixing animal raising with the cultivation of wheat and barley. Generally, they live in dispersed, often remote settlements in mud or stone, thatched houses without electricity or a nearby water supply.

Beginning in the early 1970's, CARE sought some means to address health and water problems and at the same time establish for itself a useful role in the development of Tunisia. Instead of a major capital development program to create piped water systems or drilling for new water sources, CARE applied a strategy of refurbishing existing wells and springs. This approach was relatively low cost and appropriate to circumstances where there were already many water points that had been used for decades or centuries. However, CARE went beyond a simple repair exercise to enclose wells and springs to control contamination. A chronology of all CARE water projects done in Tunisia between 1970 and 1980 is presented in Appendix B.

The first project was done near Maktar in Central Tunisia and consisted of the improvement of eight existing wells. In 1972, CARE greatly expanded the rehabilitation program and targeted improvement of some 240 water points surrounding El Kef. A.I.D. funding was requested. For the first time in Tunisia, excess local currency, generated by sale of U.S. grain under P.L. 480, was used to provide partial funding of the CARE water projects. The A.I.D. support required little documentation and minimal accountability. Unfortunately, a number of sites in El Kef were not properly reconstructed and had to be done over with a subsequent A.I.D. grant. In 1974, excess currency again provided partial funding of new projects which renovated 60 wells and springs in the somewhat better rainfed Province of Bizerte and 30 deeper wells in the drier Province of Sfax.

In 1975, CARE began a series of water projects funded by Operational Program Grants from A.I.D., which required more planning, documentation and evaluation than earlier funding. The four grant-supported projects upon which this evaluation focuses were undertaken in the provinces of Bizerte, El Kef, Kairouan and Siliana.

The CARE water projects evaluated in this study were intended to achieve goals of improved health and quality of life and had three basic purposes:

--to make potable water available by renovating and enclosing existing wells and springs;
--to institutionalize a maintenance and disinfection system at the provincial level; and
--to increase health awareness among rural populations around the project sites.

CARE initiated, arranged funding and carried out the projects. Both CARE and Tunisian officials indicated that CARE designed the projects virtually without consulting the user group and presented proposals to the Tunisian Government, more or less on a "take it or leave it" basis. Once agreement was reached they collaborated on site selection.

CARE improved 325 water points in the four project areas. Based on CARE reports, site renovation and reconstruction were accomplished in a matter of 12-18 months in each project area, with some site improvements being done in as little as two weeks. CARE selected sites from lists which were developed by provincial authorities in consultation with local leaders. Each site was surveyed by CARE to assure technical feasibility and that the water source was being used. See Appendix C on criteria for well/spring site selection.

Over half of the project sites (57 percent) were wells. Digging teams made up of temporary local laborers prepared the sites for masons who then rebuilt the well lining as needed. For the shallow wells, which averaged eight meters (25 feet) in depth, a reinforced concrete cap was then placed over the well to enclose it, and from one to three wooden-handled handpumps were installed. Also installed were a walled basin in front of the pump spout to facilitate collection and control runoff, an apron around the base, a lockable raised steel access door to allow access to the well interior, a gravity-fed channel (below ground in the earlier projects), and a watering trough several meters away to decrease the chances of fecal contamination by animals.

The handpump technology used on shallow wells in Tunisia was adopted from Peace Corps projects in Chad. In the first El Kef projects, American Dempster pumps were installed, but they did not withstand the use demanded of them for more than a year or two. So CARE arranged development of a more durable, locally-made handpump that would be combined with the imported American parts used in the well.

At 25 of the sites, in the central province of Kairouan, the wells were from 20-60 meters deep. They had to be constructed differently and at greater expense. The renovation process in Kairouan was similar to the other areas, but motorized pumps were installed in enclosed pump-rooms to draw water from the greater depths. Also, reservoirs of at least 10,000-litre capacity were built adjacent to the wells. Four public spigots were installed below the reservoirs to accommodate the large number of users.

Reconstruction of spring sites was a different process. The area around the source was excavated first, without disturbing the natural discharge of the spring. To protect against contamination, a reinforced concrete captage (catchment basin) was built around the spring. It was provided with a cement access door and capped pipe protruding from the top to permit chlorination. The water from the catchment basin was funneled below ground through a pipe to a trough at least 15 meters downhill from the source.

In addition to renovation of water sources, CARE organized and trained maintenance/disinfection teams and health education teams in each province; Peace Corps volunteers supervised construction works and coordinated education teams, under CARE guidance. Some 35 volunteers served in the four projects. Based on agreements between CARE and Tunisia, the Ministry of Public Health was to support, and run the completed projects, except in Kairouan, where a branch (Génie Rural) of the Ministry of Agriculture was responsible for maintenance. CARE also built demonstration pit latrines for selected households in El Kef, Kairouan and Siliana.

The total cost of the four projects was $1,926,000 with A.I.D. covering nearly half the costs. The Government of Tunisia also provided almost half of the funding. Appendix D summarizes these costs. The cost per site varied from $23,700 in Kairouan where the motorized system was used to under $4,000 in Bizerte and El Kef where the handpump system was installed. See Appendix E. The motorized systems, of course, served a proportionately higher number of beneficiaries. The average cost of the projects was under $20 per beneficiary. The estimated recurrent cost to the Tunisian government to support one maintenance and disinfection team serving 100 wells runs to about $20,000 per year. See Appendix F.

III. IMPACT ON AVAILABILITY AND USE OF POTABLE WATER

To assess the impact of the CARE water projects on the availability of potable water, the evaluation team visited a sample of 31 project sites and interviewed people at 30 of these. In addition, the team interviewed national and provincial officials and reviewed health and maintenance records of the Ministry of Public Health. The evaluation methodology is discussed in Appendix A, as noted earlier.

The CARE projects attempted to create a potable water system at each project site. To have impact the projects had to affect the quality of water available to rural users. The projects did not attempt to increase the quantity of water available, either through exploration of new sources or by increasing supply from existing sites.

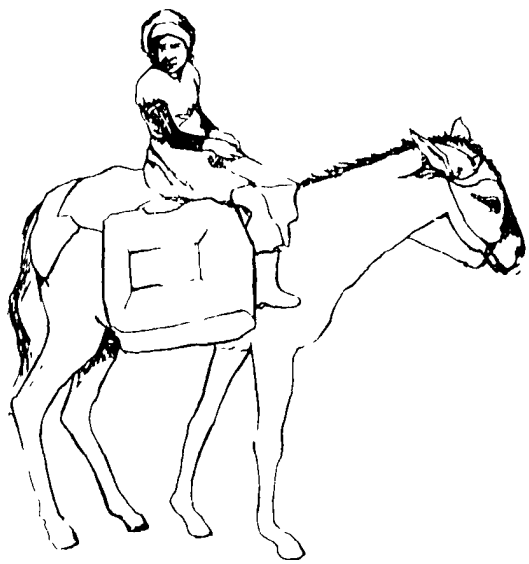
Time and resources did not permit our testing water points for contamination. As a surrogate, the team reviewed records kept by the MOPH offices and laboratories. These records showed that only about one-fourth of the improved sites were producing water that was "potable" by Tunisian public health standards. These standards varied from 10 coliform per 100 ml in one province (which is the upper limit of World Health Organization standards) to 100 per 100 ml in another. The records do show marked differences in "potability" from one site to another. Records also demonstrate that the disinfection of the wells is performed

irregularly. On the basis of these records, the team concluded the projects had no substantial impact on increasing the availability of potable water.

About 83 percent of 31 project sites visited needed repairs of some kind. Only about half of this same sample were closed systems, that is, were fully operational and showed no sign of damage that could permit surface contamination. Of the one to three handpumps installed by the projects at well sites in Bizerte, El Kef and Siliana, we found all handpumps working at nearly three-fifths of the sites and at least one pump working at four-fifths of the sites. The motorized diesel pumps used in Kairouan were operating at all five sites visited.

The team found that only two-fifths of the spring sites visited were closed systems (as compared with three-fifths of the well sites), despite the fact that maintenance of a spring system should be easier because gravity obviates the need for pumps. The government, however, has no spring maintenance program at all. In a few instances, the concrete cover on the captage (catchment basin) of the spring had been broken into or was leaking; more frequently, the cap on the access pipe to the captage was missing, exposing the system to potential contamination.

Some of the renovated water sources may have had negative impact for a few users who discontinued their own disinfection practices because they thought the water was safe, but where in fact the water may have been contaminated because project disinfection had ceased. A few women interviewed had treated their own water with disinfectant but stopped such treatment when the water source was renovated. One woman mentioned that she had boiled and filtered water for her first child who had almost no diarrhea, but that since the spring had been capped and the water treated she no longer disinfected the water in any way. She did not know project treatment of the spring had been discontinued four years earlier. She said that her two younger children born since the spring was improved had



Child in Joumine with bidoon of water

frequent diarrhea. She believed her water was safe, and she seemed unable to draw the conclusion that perhaps her water source could be contributing to the younger children's diarrhea.

Women at eight of 30 sites (27 percent) expressed a sense of security in their renovated water points. Only at one of these eight, however, were they probably justified in believing the water to be clean. Based on observation and MOPH records, only that site was being maintained as a closed system and the well regularly disinfected. Water potability was much more suspect at the seven other sites.

Generally, rural Tunisians interviewed did not believe they needed cleaner water. Water is considered "good" if it is free of visible matter and tastes "sweet", that is, does not taste of iron or salt. Many do not believe water can cause illness. Based on interviewee responses, there is yet insufficient health awareness among rural Tunisians to create demand for potable water.

IV. IMPACT ON HEALTH AND QUALITY OF LIFE

The evaluation was not able to demonstrate a relationship between the incidence of water-related disease and the CARE water projects. Thus, it was not possible to assess progress toward achievement of the project goal of bettering the quality of life through improvement in health conditions. National and regional health officials in Tunisia claim that incidences of cholera and typhoid have fallen over the past five years. Some attribute these changes to the water projects. The evaluation team, however, is reluctant to draw such conclusions for several reasons.

First, statistics on infant mortality and morbidity related to waterborne diseases were not collected on a project site basis. Also, as noted earlier, MOPH records would suggest that "potable" water is only available at about one-fourth of the sites.

Secondly, beneficiary interviews did not yield a conclusive case for health impact on adults or children. Because of different perceptions of time, often the women interviewees appeared unable to recall accurately their own health status or those of their children before the projects; and they were unable to identify any change, if indeed there had been any.

Thirdly, water is only one of many factors which influence health. The team found that when water-related disease occurred at a project site, it was not possible to tell whether the project source or some other factor had been responsible.

For example, at one site, an improved shallow well with a handpump, a typhoid epidemic had occurred two years before, some time after the well had been improved. Hospital records confirmed the epidemic. According to disinfection and maintenance records kept by the regional health office, a gargoulette had been placed in the well before the epidemic,

but it was not replaced for two months. After the first typhoid case in the area entered the hospital, laboratory analysis of the well showed the water was contaminated (2,400 coliform per 100 ml) but there were no E. coli. Although the records indicated that a disinfection team made regular visits to disinfect the well during subsequent months, cases of typhoid among users of the well continued to appear. The regional health office concluded that the source of infection was at a nearby unimproved well. Those who had been ill told us that they did not use this other source, but the women admitted that they did their laundry in the oued (river bed). The area they pointed out was on the hillside men used for defecation. Runoff during the rainy winter months could have contaminated the river bed water; but it is also possible that women may have used the other well at the time but could not remember it. Poor sanitary practices could not be ruled out as a possible cause for infection.

The impact of the CARE water projects on other aspects of beneficiaries was minimal. Generally, water use patterns were not altered by the projects. Interviewees said that the projects did not increase water supply, access or site use. Some of the women and children walk up to six kilometers (3 3/4 miles) from home to draw water. Indeed, the long distances from the water sites appeared to be a major factor in limiting the quantity of water used per person, which averaged about 10 liters a day, ranging from as little as 5 liters to around 25 liters per person per day (lcd). (About 25-30 lcd is considered the norm for safe health status by the American Public Health Association.)

It did not appear that renovation of the sites had created any new demand on the water source. All the sites, except one, were being used at the time of the team's visit. The average use appeared to be about 300 persons per site, below the figure of 500 that CARE had estimated in some project documents. Fewer people rely on the springs, but the five deep wells with motorized pumps visited in Kairouan averaged 1,200 daily users.

Women frequently said that the handpumps were easier to use than buckets, particularly if the well was deep, because their arms do not ache as much as before when they had to pull the bucket up with a rope. The motorized systems were even easier to use, since they merely involved turning on a spigot. One result of this was that children too short to reach a handpump or lower a bucket into a well, are now carrying tiny pails of water for their mothers.

In a few cases, the women pointed out that it took much longer to draw water, especially at shallow well sites which get heavy use. After the pump was installed only one person could use the pump at a time, when as many as 10 could dip their buckets into the well when it was open. Breakdowns have caused great inconvenience. When a pump is broken, or when the water level is so low that the pump cannct function properly, the accessibility and dependability of the water system are breached. Even when they forced open the hatch, only one

person at a time could dip a bucket into it.

Women did feel that covering over wells made it safer to draw water, particularly for small children who accompany their mothers to the well or play near the well unsupervised. They recounted incidences of children and livestock falling and drowning in the wells before they were covered.

Finally, the concept of change introduced as an element of rural life may be cautiously suggested as a project impact. Among many rural Tunisians, the notion that people can effect change is relatively new. At sites where renovation of water points and disinfection had occurred, some inhabitants viewed these changes positively as something "modern" and therefore good regardless of whether any connection could be made concerning water and illness. However, it may be necessary to assess impact of this kind over the course of a generation.

V. IMPACT ON PARTICIPATION

The participation of beneficiaries in the projects was on the whole very limited. It varied greatly depending upon the critical need for water.

The projects themselves did not seek local participation in the design or the implementation of the water source improvements. Users did not participate directly in the decision to have a project. Women in fact seldom knew that a project was to be done until the construction crews arrived. Some men said they had contacted the local cheikh to lobby for certain sites, but the selection was made by provincial officials and CARE. At most sites, a few local men would gain temporary employment as well diggers during the construction phase. According to CARE, it operated like a "construction company" in implementing the water projects, taking orders from provincial officials, surveying sites, coordinating all inputs, hiring laborers, supervising work, and meeting production deadlines.

In the wetter areas, there was little community participation after projects were completed. In most of the project areas, the population is widely dispersed and a sense of community is lacking. In addition, the prevalence of alternative water sources, such as springs and river beds, makes it difficult to generate responsibility or interest among the users. The contracts between CARE and the Governments of El Kef and Siliana provided that one interested and responsible person in each well area be equipped with tools and trained to perform basic preventive maintenance and repairs. However, CARE employees found this plan did not work. Tools disappeared, and local people did not want to assume such responsibilities without pay.

In three cases local initiative had been taken to adapt water use or repair project sites. Farmers at two well sites had diverted runoff to irrigate small plots of food crops nearby. One landowner in Joumine

in the Bizerte project area pointed out that he had taken it upon himself to repair a blocked pipeline between the spring and the point of use. The spring was on property he had donated for the project, and he felt some proprietary concern.

Participation is greatest in the driest area, Kairouan, where the need for water is most critical. It is minimal in the wetter areas of Bizerte and El Kef where alternative water sources are available. In Kairouan, users participated in assuring that their critical water supply continued to function by levying a fee on themselves to cover costs of fuel and maintenance.

The Kairouan project uses motorized pumps which require fuel. This fuel is not paid for by the provincial government but is the responsibility of the cheikh. Officials said they neither encourage nor regulate charges for the water, but they do pay the salaries of local guardians who look after the wells. The project anticipated use of guardians, but collection of fees from users was not intended. Since there are no alternative water sources, fee collection is relatively easy for users to regulate.

Of the five project sites visited in Kairouan, we found three in which the users had taken collective action to establish variable rates to pay diesel fuel costs. Fees were assessed by household on a monthly basis ranging from 500 millimes (ca. $1.25) per month to nothing for those too poor to pay. In one community a local organization grew out of an existing series of quarterly clan meetings and provided basic types of assessment, collection and accounting of water use fees.

At two other sites, however, guardians were resented because they had imposed a fee system without community agreement. At one of these sites, the fee was assessed for each visit to the well according to the size of container used. The procedure had so enraged the community that they had forced the guardian's removal and were in the process of arranging the appointment of a new guardian, a relative of the community leader.

VI. IMPACT ON INSTITUTIONS

The evaluation team was particularly concerned with project impact on Tunisian institutions, because project sustainability is directly associated with it. The projects sought to institutionalize maintenance, disinfection, and health education components.

Maintenance: Effective project maintenance has become a major problem for the Ministry of Public Health even though the projects are only a few years old. Seven mobile maintenance teams, consisting of a driver, disinfection technician, and a pump repairman, were trained by CARE and taken over by the MOPH at the provincial level. Although they still function and use the diesel Land Rovers provided by CARE, the teams do not operate very effectively and their impact is not conspicuous at most sites.

Interviews revealed that only 5 of 30 (17 percent) of the sites had been visited by maintenance teams within the previous month. Regularity of visits varied from project area to project area. In Bizerte, one team was making weekly inspections of well sites, while a second team in a different zone was on a semi-monthly schedule of visits. Spring sites are not maintained, even though there was obvious need in several locations, because well maintenance is given higher priority.

In Siliana, records of the MOPH showed that many sites were visited only once per month although those located near the town of Maktar, where the team is based, received more attention. Three maintenance teams are functioning in the Province of El Kef, but pumps are not being repaired promptly because of an irregular visitation schedule. Inadequate supervision of poorly motivated personnel seemed to be the cause of the problem. A flurry of activity was reported in anticipation of the evaluation. a sign that the system could be geared up to provide maintenance when necessary.

Maintenance of springs has proven to be a problem, even though there are no moveable parts to break down. Because of irregular flows of water during the year, some users have forced open the catchment basin (captage) in order to gain access to the pool of water underneath. Others have also blocked the pipe so that the water collects in the captage, increasing the flow when the pipe is opened again. The resulting pressure may cause the captage to leak, or force the spring to find another outlet, reducing the flow in the pipe.

Government records on well repairs were not always accurate. For example, the records indicated that leathers had been replaced on one pump two weeks prior to our visit, but the pump handle was missing and it did not appear that the well had been maintained for some time.

Disinfection: To reduce water contamination the projects were designed to provide regular disinfection of wells and springs. However, none of the project agreements specified the type of disinfection system to be used. The objective was to insitutionalize a regular maintenance and disinfection system at the provincial level.

The evaluation team found that combined maintenance/disinfection teams trained by CARE existed and were budgeted in each project area. But based on site interviews, the teams were having limited impact. Only 27 percent of the sample sites had been visited by the maintenance/disinfection teams within the preceding two weeks, the period intended by the projects. In addition, there was evidence that even when the disinfection was performed on a regular basis, it was still inadequate. For example, records kept by the MOPH regional offices often showed that even when wells were disinfected every two weeks, at the end of that period there was no residual chlorine in the water and coliform were present.

A part of the problem of disinfection is in finding a system that will work with rural people in remote areas. To disinfect wells, the

Tunisian Government initially adopted a system of maintaining a chlorine residue by placing a gargoulette (or jarre) in the well; but this method now seems to have been largely abandoned. Only one gargoulette was present in any of the wells visited. Apparently, the jarre technique had been adapted from an earlier non-CARE project in Cap Bon, Tunisia; but similar methods have been used in South Asia for some time. This system provides a gradual release of chlorine over a period of 14-21 days, in amounts which are supposed to be palatable. The elongated clay pots used in Tunisia are filled with a lime and gravel mixture, with holes to permit gradual seepage of chlorine, and are lowered into the well. The maintenance and disinfection teams were to replace the gargoulette every two weeks. Several health officials explained that gargoulettes frequently were pulled out of the well and broken. They were not sure why, but they confided that the people did not like chlorine in their water because it ruined the taste of their tea. Indeed, some interviewees said that people would hurry to draw water before disinfection was done because the water was considered undrinkable for a day or more afterwards.

Girl in Sedjanane carrying gargoulette

The gargoulette method generally has been replaced by periodic chlorination called "javelling". Chlorine bleach is poured directly into the water, which guarantees disinfection for a period which varies with the quantities of bleach used and organic matter in the water. Health officials in Siliana admitted that "javelling" is an inferior method, but they also do not know of an acceptable approach.

The government does not have a disinfection system for unimproved alternative sources such as river beds, springs and wells, or for springs improved by the projects. Health officials were concerned about the lack of treatment of these sources, but this type of public health measure is not assigned a high budgetary priority relative to curative medicine.

Although it was not required by the projects, the Ministry of Public Health in Tunis has instituted a system where local health officials keep records on the disinfection of wells improved under the CARE projects. No such records are kept on improved springs. Records are being maintained on the date the well was disinfected, the type of disinfection performed, and the qualitative results of the laboratory analysis of well samples. The record keeping was being done, although there is no follow-up supervision of the maintenance and disinfection reports and the reliability of the MOPH data could not be confirmed.

Health Education: The health education component of the projects was provided to increase the chances that users would not contaminate water that was potable at the source. CARE officials said their first project proposal to A.I.D. excluded this element, but A.I.D. insisted it be added. CARE trained teams in each project area and provided Land Rovers for their use. The teams consisted of a male driver and two educated Tunisian women who were to instruct water users in health and sanitation practices.

Sustaining health education has proven to be difficult for the health authorities and the teams have not been very effective. Interviewees at half (15 of 30) of the sites said they had been visited by a health team but only two of these were visited within the preceding month. Some said they had been last visited one to three years earlier. Three of the four MOPH health education teams still exist, in El Kef, Kairouan and Siliana. The fourth team in Bizerte was abandoned soon after MOPH assumed responsibility for it, due to lack of budget and vehicle breakdowns.

A major problem is that the medical establishment in Tunisia is heavily oriented toward curative rather than preventive health care, so that the health teams are not assigned a high priority by the Ministry. Since the project teams work from central health offices, they need vehicles to transport them to rural areas. Their cars, however, are often requisitioned for other purposes; in addition, many of the rural sites are inaccessible by car during rainy months of the year. In some areas, the health education teams visited the same areas as the MOPH teams providing vaccinations and family planning information, and there was unnecessary duplication of functions.

Another problem is that the Government of Tunisia requires French to qualify for employment which effectively excludes most rural women from becoming health educators. Rural Tunisian women often do not accept urban women because of their different mores and dress. Without constant supervision, the health teams become lax and inattentive, spending their time in neighborhood markets. Finally, without continuing education on other health topics, the program may become repetitive.

As a part of the broader health education component, CARE introduced latrines in selected sites for their demonstration value. CARE helped some selected users around project sites to build their own latrines. However, this component does not appear to be successful. Interviewees seem to treat latrines as symbols of modernity rather than means of sanitation. Several interviewees complained of the bad odor associated with them. Some latrines ended up being used for storage, for chicken coops or for other purposes. At other times, the latrines were kept operating only for the benefit of relatives visiting from the city.

VII. CONCLUSIONS AND ISSUES OF CURRENT PROJECTS

Although the water projects were aimed at the rural poor and were implemented basically as planned, they were not successful in making available consistently potable water. Furthermore, health benefits cannot be expected from potable water projects if water quality is not improved. The projects were prepackaged and local participation was minimal; and they did not address the major apparent user perceived needs of greater access and more water.

The water projects assisted by CARE are at a point where certain issues must be resolved. If the wells and springs are not regularly maintained, they will soon be too costly to repair. Unless an improved and regular method of disinfection is found, it will be impossible to ensure that the water is not contaminated as it comes from the improved source. And unless the delivery and effectiveness of health education improve, there is little to ensure that clean water will remain clean by the time it is consumed. For the projects to produce consistently potable water, Tunisians must pay immediate attention to maintenance, disinfection problems, and health education.

Maintenance: Many of the repairs needed to improve the well and spring sites were minor, ones which could have been avoided by preventive maintenance or repaired with simple tools. Either the participation of local residents to do minor repairs must be promoted or the sites must be regularly visited by a maintenance team that is well supervised. Without adequate maintenance, any rural water projects will fail.

An immediate obstacle to sustaining the CARE shallow wells project is the availability of spare parts. The "buy America" policy of U.S. aid dictated that most project procurement be from the United States. At present, however, U.S. manufactured parts for handpumps are not available on the local market and the MOPH officials in Tunis state that they do not have the administrative apparatus to procure them. In response to this dilemma, the Ministry of Public Health is transferring responsibility for maintenance of pumps to Génie Rural, the Ministry of Agriculture's Rural Engineering Division, which by an August 1977 decree was vested with authority to maintain rural water points (other than handpumps systems improved by CARE). Génie Rural, however, reports that it is constrained by law from procuring equipment which does not have manufacturer's representation in country. Génie Rural hopes this problem can be overcome by the establishment of a dealer/importer for the French-made Vergnet or similar pump, which can then be standardized throughout the country. Because of the demand for pumps is so low, Génie Rural and CARE believe it is highly unlikely that an American pump manufacturer will be interested in establishing a dealership in Tunisia to compete with other dealers already there. What this suggests is that all the CARE pumps will eventually have to be converted to a pump type available in Tunisia, if the government wishes to keep the pumps functioning or to expand on the CARE projects. No Tunisian government agency has ordered replacement pumps or spare

parts on its own and they continue to seek assistance from CARE or other donors for this service. For example, at the end of the El Kef project, Génie Rural asked CARE for an additional 65 handpumps.1/

Disinfection: The MOPH needs to explore various disinfection systems at the sites to determine which will be most effective. Even if the wells are maintained and repaired regularly, there is still danger of contamination from runoff, and there appears to be a considerable problem with the local populace breaking into the wells through the hatch cover. In addition, there should be better supervision of the teams.

Health Education: The health education component of the projects needs to be given greater support by administrators and public health professionals. Greater health awareness is needed to create a demand for potable water among rural Tunisians, particularly in those areas where there are alternative sources of supply. The MOPH should also experiment with and measure the effect of a variety of approaches to delivering health messages to rural peoples, as suggested in a recent CARE concept paper. Also, the health education program should be expanded to include more topics, in order to alleviate boredom of the health team and increase the information received by the rural population. The program should stress use of disinfection techniques in the home since the water from the improved sources is not reliable, and since alternative unimproved sources are frequently used. The health teams should have exclusive use of the vehicle that was provided to them by CARE, and they should be better supervised. Finally, alternative health education approaches should be tried, such as education of women in the community to teach their neighbors about health, or use of existing successful rural vaccination and family planning teams.

VIII. FUTURE PROJECTS IN TUNISIA

Future projects can benefit from past experience. The Government of Tunisia already appears to be focusing greater attention on potable water which may be attributed in part to the CARE water projects. Génie Rural has begun to direct its attention to designing and constructing water systems with increased emphasis on potability. A new section, Service d'eau Potable et de Pollution, has been created to deal with potable water, although MOPH still has primary responsibility for the projects provided by CARE. In Kairouan province, the Rural Development Office of the Governor is undertaking major water supply projects which include motorized water systems based on the CARE design.

1/ A.I.D./Tunisia plans to enter into a contract in 1980 with the Georgia Institute of Technology for the local manufacture, testing, and demonstration of the A.I.D./Battelle handpump (which was developed earlier under an A.I.D. research project).

A continuing issue that must be faced by future projects is the standard against which potability should be measured. Recent A.I.D. grants to CARE for new projects in Siliana and Kasserine will measure potability against WHO standards which CARE/Tunisia says cannot be achieved. The grant agreement was written in A.I.D./Washington and countersigned in CARE/New York before CARE/Tunisia learned of inclusion of this provision. There are many degrees of water contamination, so that WHO standards of potability may needlessly up the "ante" to a level that cannot be achieved.

Throughout the projects, CARE was flexible in adapting the technology of its basic model, for example in arranging for a locally-made handpump mechanism. However, A.I.D. and other donors generally have been unresponsive to the introduction of drilled-well technology, despite the recommendations of three different A.I.D.-funded American consulting reports since 1976. The drilled-well technology might extend the range and impact of future rural water projects by increasing water supplies that are not as easily contaminated as shallow dug wells.

If future projects seek a health goal through potable water, they need to pursue complementary strategies such as the provision of public health and medical personnel (not just construction specialists), participant training in preventive medicine, public education programs, or in-country health courses for local medical students. Health is affected by many factors besides clean water. The CARE projects used largely engineering means to achieve health ends; they provided water supply hardware with a public health component added on. Health education must be more than just an add-on to potable water projects. Health teams that work principally with adults must have their work reinforced by general education of children on health practices.

CARE and other development organizations continue to receive requests for assistance for potable water projects from the Tunisian government. Over the past year, CARE, Peace Corps, the Central Tunisia Development Agency (CTDA), and A.I.D. have begun to re-examine their strategies and policies. There are Tunisian officials, however, who question the need for potable water service at all. They argue that the real problem for rural Tunisia is supply of water of any quality, which is more critical than potability. Indeed, those interviewed at the sites said that about one-half run dry or nearly dry in summer. Yet improved health practices often require use of larger volumes of water to wash hands, clean utensils and otherwise reduce contamination. Because the population is dispersed, the distances people have to walk effectively limit water use. It remains to be seen whether the interest in providing potable water, with all its complications, will give way to a strategy of increasing water supply.

There are opportunities for Tunisian-American cooperation in future water projects, but working relations need to be strengthened by:

--agreeing on a long-term strategy which either seeks to achieve water development per se or to improve public health wherein potable water is but one element;

--seeking imaginative solutions to the problems of maintenance and supervision and recurrent costs;

--experimenting with various approaches to water development including the drilled wells technology recommended in previous consulting reports; and

--joining together to undertake evaluations that provide project guidance, periodic inspection and better documentation.

IX. LESSONS LEARNED

Lesson 1: Unless host governments are willing and capable to undertake the substantial requirements of sustaining potable water projects, A.I.D. should concentrate funding on water projects which set goals of increased water quantity, dependability, and accessibility.

Lesson 2: Water potability should be viewed in relative not absolute terms, especially if the United Nations is to achieve its goal of providing potable water for a billion more people during the Drinking Water Decade (1981-1990). Given the difficulties of producing potable water, it may not be possible to achieve World Health Organization standards of potability in many development countries during the Decade.

Lesson 3: Water projects should be designed to:

--reflect demonstrated community need rather than prepackaged donor solutions; projects should be planned collaboratively by benefactors and beneficiaries;

--provide initial social surveys at each proposed site to determine:
  --local needs,
  --health awareness, and
  --receptivity of local residents to participation in project implementation; and

--assure that sites selected take into account the liklihood that beneficiaries will maintain and sustain the improved water sources.

Such design surveys might conclude that projects would not be successful in some areas, and that interventions in those places are not warranted.

APPENDIX A

METHODOLOGY
(WITH DATA COLLECTION FORM AND RAW DATA)

METHODOLOGY

The evaluation team consisted of six Americans. Two members represented A.I.D. in Washington: the team leader/geographer, from the Office of Private and Voluntary Cooperation; and a lawyer from General Counsel. The team anthropologist, who was fluent in Arabic, was hired under contract in Tunisia. CARE/New York was invited to provide a team participant since it was the project implementation agency; it made available a CARE/Haiti program and wells specialist. In Tunisia, A.I.D. and CARE arranged for additional Arabic speakers: an ex-Peace Corps Volunteer wells specialist, now with CARE/Tunisia; and a Peace Corps Volunteer microbiologist.

In line with the methodology prescribed by the A.I.D. impact evaluation series, this study was done in the field for a period of about three weeks and focused on completed projects that had been supported by A.I.D. The A.I.D. Washington and CARE/Haiti team members participated in a three-day workshop in Washington prior to the field work. Also, an evaluation guidance committee was formed, composed of representatives from various offices of A.I.D. in Washington, CARE and the Peace Corps. The committee met several times before the field work to help the team formulate the evaluation design and questions and after to critically review various drafts of the evaluation report.

The first three days were spent in Tunis to:

--refine the evaluation design and orient the team;
--confirm or arrange logistical support for the field work;
--discuss the evaluation with officials of the ministries of Public Health and Agriculture (Génie Rural);
--brief officials of CARE, Peace Corps and A.I.D./Tunisia;
--prepare and duplicate the data collection form/questionnaire; and
--to select the project areas to be visited.

The evaluation focused on the two older project areas of Bizerte and El Kef, but also included Kairouan because of its very different system of motorized pumps over deep wells. Siliana was given less attention only because of time constraints. Site selection was made by project area from CARE lists of all 325 completed sites.

The sample sites were selected randomly, stratified by type of water point (well or spring) and by geographical distribution among districts within each project area. See the attached table showing sample site selection. The sample included 31 project sites and four non-project sites where observations were made by the team. Interviews were conducted at 30 project sites and four non-project sites. The team had little difficulty finding interviewees at or near all water points, except at one spring used during the summer season where there was no one to be found. Interviews were conducted in Arabic, sometimes in groups and sometimes individually, and included both men and women.

An attempt was made to interview the men and women separately, so that the women would speak more freely; this effort was successful at most sites.

The data were recorded by site on a data collection form which included site observations, questions and answers of beneficiaries, and notes on the sites taken in discussions with officials. (See the data collection form and raw data collations attached to this appendix.) At the end of each site visit all interviewers and other team members would get together to recapitulate information collected on the site through observation and interviews. At times the team divided into two groups to do site visits and interviews of officials at separate locations. Officials at the local and provincial levels were also contacted and interviewed in the field.

The impact of the projects on water potability could not be measured precisely since reliable baseline data did not exist and time and resources did not allow the team to test the water at the sample sites. The MOPH records were used as a surrogate. The evaluation team, however, believes that these MOPH data provide only a rough index to water potability. Quantitative analysis of the data was not possible because the records are presented in qualitative not quantitative terms, i.e., "clean" or "unclean," and the reliability of the data could not be confirmed.

Two weeks were spent in the field. During this period the team met twice in somewhat more reflective sessions to review the progress of the field work, determine whether the questions were being answered adequately, collate data and plan further activities. The team found it very helpful to reconsider the various elements of the project design which had been stated in logical framework terms early in the evaluation process. These field reviews helped the team to keep on track with the work.

The final four days were spent in Tunis to:

--review and collate all data;
--brainstorm and assess lessons learned by the team;
--debrief officials of CARE, Peace Corps and A.I.D./Tunisia; and
--prepare a first draft of the report.

Lessons Learned

1. The impact evaluation series provides an excellent learning opportunity for personnel in A.I.D. An important training function is performed, as intended, even for A.I.D. staff with much experience in development, evaluation research, academics or the field. An agency employee should welcome an opportunity to participate in an impact study.

2. Those who learn most from an evaluation are the evaluators. The Agency and its staff grow from direct participation in the evaluation process. The series also can help to create within A.I.D. a greater constituency for evaluation.

3. The temptation to lengthen the period of field work beyond three weeks should be resisted. The opportunity costs to A.I.D. staff's offices, not to mention the team members, can be considerable. However, the lead-time between team selection and departure for the field should be greater, so that the actual evaluation work can begin as soon as possible after the team arrives in-country. An evaluation guidance committee, like the one used for this study, can increase the efficiency of the team both in these early stages and later in reviewing drafts of the report.

4. A.I.D. should try to recruit new personnel with expertise in language, research skills, and technical specialties, useful to doing the impact evaluations. To the extent that hiring constraints permit, the talent bank of the Agency should be broadened.

5. The majority of A.I.D. staff who have participated in the series are based in Washington. Field staff should be given greater opportunities.

6. Where projects have been implemented by private and voluntary organizations and other intermediaries, the implementing agency should be invited to participate in the evaluation--to learn with A.I.D. as it were. The personnel of the intermediary must be objective, in the same way we expect A.I.D. team members to be objective.

SAMPLE SITE SELECTION

Project Sites/Sample	Project Area				TOTAL	%
	BIZERTE	EL KEF	KAIROUAN	SILIANA		
Sites Improved Wells	17	89	25	55	186	57
Springs	103	11	0	25	139	43
Total Sites	120	100	25	80	325	100
Sample Project Wells	3	9	5	2	19	61
Springs	12[a/]	0	0	0	12	39
Project Sites Subtotal	15	9	5	2	31	100
Non-Project Wells	1	2	0	0	3	--
Springs	1	0	0	0	1	--
Non-Project Sites Subtotal	2	2	0	0	4	--

a/ No interviews were conducted at one of these sites because no one was around. Only observations were made.

DATA COLLECTION FORM

TUNISIA CARE WATER PROJECTS

IMPACT EVALUATION

(REVISED 3/80)

I. SITE IDENTIFICATION

TEAM _____

DATE: _____ TIME (AM/PM) _____

PROJECT NAME _____ (Indicate if nonproject site: _____)

WATER SOURCE: Well _____ Spring _____

SITE NAME _____

POPULATION FAMILIES _____ PERSONS _____

OMDAT _____

DELEGATION _____

HEALTH REGION DESIGNATION _____

II. OBSERVATIONS AND SECONDARY SOURCE INFORMATION

a. Physical Characteristics of site (elevation terrain, etc) _____

_____

b. Rainfall Data Station Nearest _____ Source _____

c. Average Rainfall (ALL years) _____ cm

d. Average Rainfall (1977-1980) _____ cm

Rainfall Distribution

Rainy Months (Circle) J F M A M J J A S O N D

Dry Months (Circle) J F M A M J J A S O N D

f. Description of Settlement Pattern:

Discrete village
Discrete village and dispersed population
Dispersed population and rudimentary village
Dispersed population
Other (specify)

g. Description of beneficiaries (including any significant ethnic, religious, or other distinctions)

_____

h. Is the improved water source working?_____no_____yes

Partially_____.

If not, why? Broken pump_____

Other (describe)_____

i. Description of improved water source

Number of daily users (estimate)_____

Consumption per capita (estimate)_____

Present Volume Use (estimate)_____L/Day_____

Accessibility_____

Water Quality_____

Water Level/Well Depth_____

Pump Type: Hand_____Motorized_____

No. of Taps_____

Other Observations:_____

j. Description of alternative water source (if any):_____

III. Beneficiary Questionnaire

1. Whose idea was it for this project/improved source?

villagers; local leaders; government officials; foreign project personnel;

other (specify)_____

2. Who fixed the well? (i.e. who did this project?)_____

3. Who paid for it?_____

4. Who does this well belong to?_____

5. Did the people understand what was going to happen?_____

6. Who fetches the water?_____

7. Is it easier to use the pump than the bucke. to draw water?_____

_____

8. Is water quality good, acceptable, poor?_____

9. How much water do you take?_____

10. How many times a day?_____

11. Is the water source convenient?

How far away is it from home?_____

12. How long do you stay at the well?_____

13. Is water available all year? When is it not available? Why?_____

_____

14. Is water available all day? _____

15. Has a maintenance team come? No_____Yes_____

16. When did the mainteannce team last come?_____

17. How often does it come?_____

18. What do they do?_____

19. What do the people do when the pump is broken?_____

_____

20. What do you do to water before you drink it?_____

_____

21. Is there a charge for water? If yes, how is it calculated?

Is it fair?_____

_____

22. What is the source of water?

	WET SEASON	DRY SEASON
For		
Drinking		
Cooking		

For	WET SEASON	DRY SEASON
Bathing		
Laundry		
Water for Animals		
Minor irrigation		

23. How has improved water source(s) affected the people's water use? (include time saving; increased use)

24. If there is time saving, how is it used?

25. How is waste water used or disposed of?

26. Have health educators visited? No Yes

27. Have the villagers been instructed on the health benefits of clean water?

28. If so, by whom?

29. How often did they come?

30. What did they say?

31. Where does sickness come from? Can it come from water?

32. Has the health of the population changed since the improved water source was provided? (skin, intestinal problems, etc.)

33. Have you seen the water being disinfected? No_____ Yes_____

(describe by whom, when, etc.)

_____

_____

_____

34. Have you seen health leaflets, or any health information distributed?

No_____ Yes_____

(Describe)_____

_____

35. How is excreta disposed of?_____

36. How many latrines are in the area?_____

37. Are they used?_____

38. If you have animals, where do you keep them?_____

39. How is water carried from the well?_____

40. Where is it stored? Is it covered?_____

_____

41. Are there any other project benefits or disadvantages?_____

_____

_____

RAW DATA COLLATIONS—OPERATION AND USE OF SAMPLE SITES: TUNISIA CARE WATER PROJECTS

What project sites were visited?			Are they operating?			Are they being used?		
Gouvernorate/ Delegation	Site	Well/ Spring (M motorized)	Fully closed system Yes/No	For wells pumps worked Yes/No	Repairs needed	Est. no daily users	Est LPCD water use liters	Seasonal variation (dry season use)
1 Bizerte/ Utique	Bir Bou Fares	W	No	No	Handle for pump, door replaced	85-100	25	No
2 Utique	Ain Nechina	S	Yes		None			Used only in summer by agricultural laborers
3 Mateur	Ain Sidi Salah Bouzabrine	S	No		New cover for settling basin	100	5	Trickle in summer
4 Mateur	Bir Attarof	W	No	Yes	Bolt door	300	5 6	No
5 Sedjanane	Bir Sidi Salem	W	No	Yes	Needs door and trough system blocked	500	26	No
6 Control								
7 Sedjanane	Ain Chabet El Hout	S	No		Captage leaking badly	300	5	No
8 Sedjanane	Ain Essouda	S	No		Captage door not sealed	300	5[illegible]	Slower in summer
9 Sedjanane	Ain Smayra	S	Yes		None	150	11	No
10 Sedjanane	Ain Dridira	S	No		Reseal system clean basin	50	6[illegible]	No
11 Joumine	Ain Mallakta	S	Yes		None	150 200	5[illegible]	Slow in summer
12 Sedjanane	Ain El Goumria	S	Yes		None	300	7	Use another in summer
13 Control								
14 Joumine	Ain Choucha	S	No		New pipeline close system	120	6	Slows in summer
15 Joumine	Ain Mizab Kelbine	S	No		Cap on captage	50	10 14	No
16 Joumine	Ain Haroun	S	Yes		None	250	5[illegible]	Slows in summer
17 Joumine	Ain Ali Ben Hediriche	S	No		Cap on captage	60	14	No
18 Kef/ Tadjerouine	Bir El Fedj	W	Yes	Yes	None	300	7[illegible]	Almost dry in summer Use another source
19 Kef/ Tadjerouine	Bir Kaid Mizzaine	W	Yes	Yes	Pump base is leaking needs sealing	300W/ 800S	10	None
20 Kallatsenan	Bir Mohamed Ben Salem	W	No	Yes but well dry	Door open needs cleaning	200	10	Dries up without rain
21 Nabeur	Bir Fteimia	W	No	No	Handle & pump rod door not enough water to use pump	350	5	Dry in summer
22 Nabeur	Bir De[illegible]ass	W	No	1 Yes 1 No	Door replaced handle for pump and pump rod	350 600	9 22	None
23 Control								
24 Kef/Kef	Bir Ouled Gharbi	W	Yes	1 Yes 1 No	Foot valves	450 650	12	Must wait in summer because of use of well for irrigation
25 Kef/ Dahmani	Bir Ouled Mouella	W	No	1 No 1 Yes	Handle pump rod, base plate and handle	600	8	Dry in summer, have to go 6 km to get water at another source (unimproved)
26 Kef/ Dahmani	Bir Ouled Ben Noui	W	No	No	Both pumps—pump rod, door bolted	300	12	None
27 Control								
28 Kef/Ksour	Bir Ouled Dakhli	W	Yes	All 3—Yes	Base plate leaking	300	10	None

What project sites were visited?			Are they operating?			Are they being used?		
Gouvernorate/ Delegation	Site	Well/ Spring (M motor-ized)	Fully closed system Yes/No	For wells pumps worked Yes/No	Repairs needed	Est no daily users	Est LPCD water use liters	Seasonal variation (dry season use)
29 Siliana/ Makthar	Bir Bit Hadj Abdallah	W	Yes	Yes	None	300W/ 2000S	2 4W 6 12S	Less water in summer, use another source (spring)
30 Makthar	Bir Lahfou	W	Yes	Yes	Had been broken 1 yr recent repairs (knew of visit)	130	8	Dry in summer, must go 7 km to unimproved source
31 Kairouan/ El Ala	Bir Fejejna	W(M)	Yes	Yes	Clutan needed repair	600 800	10	None
32 Haffouz	Bir Khataffa	W(M)	Yes	Yes	4 broken spigots out of 4 (1 useable)	700 900	14	None
33 Kairouan Plaine	Bir Hadj Othman	W(M)	Yes	Yes	Exhaust leak off head	1200	13	None
34 Sidi Amor Bou Hajala	Bir Ahmed	W(M)	Yes	Yes	None	1200	9	Less in summer but better after improve ment (dug deeper by G R)
35 Nasarallah	Bir El Ksour	W(M)	Yes	Yes	One faucet	2500	14	None
TOTALS		Wells 19 Springs 12	16 Yes 15 No	Working 13 Not working 6	Need repair 22 Not needing 9	See Note	9 8 10 6	

Note Overall Median 300 population Kairouan Median 1 200 population

	Have they been recently disinfected?			Have they been maintained?			Have they been visited by Health Ed Team?		
	Yes/No	Time since last dis-infected	Comment	Yes/No or Partial	Date last visited	Comment	Yes/No	Date last visited or how often	Comment
1	Yes	1 week	No gargoulette	P	1 week	No parts available	No	Never	Less diarrhea in children since well improvement
2									
3	No	4 years		No	4 years		No	Never	More diarrhea reported (refer to HH)
4	Yes	3 days	No gargoulette	Yes	3 days	Confirmed by Sante Publique control forms	No	Never	
5	Yes	1 week	Rusty taste, no gargoulette	Yes	1 week		Yes,	?	Man drew water from open hatch even though pump was working
6	Control								
7	No	1 year ago		No	1 year	Users forced to use closed system as alternate source 2 miles away because of break in captage reducing water flow	Yes,	Not available	Stopped using javel after health team stopped coming
8	No	3 mo yr		No	3 mo yr	Spigot too low below water level in trough	Yes,	3 years	
9	No	Never	Iron in water	No		Not broken	Yes,		Newly formed team girl had health instruction in school
10	No	3 yrs		No	3 yrs	Germans had installed pump on captage	Yes,	1 yr	Probably not original team people use javel in home
11	No	1 yr	Come during summer	No		No need	No		Children had seen health educ pamphlets at school
12	No	3 yrs	Occasionally javel water at home	No	3 yrs	No need	Yes,	Recent	New team
13	Control								
14	No	Never		No	Never	Man had attempted repair as he could	No	Never	Stored water in galvanized can
15	No	Uncertain		No	Uncert		No		
16	No	1 yr		No		No need	No		
17	No	1 3 yrs		No	1 3 yrs		No		
18	Yes	1 mo	No gargoulette	P	1 mo		No		More diarrhea before well improved more in summer than winter
19	No	2 mo	No gargoulette	P	2 mo		Yes	Uncertain	Before used javel in water but now they don't
20	No	1 yr	Well dry/ no gargoulette	no		Pump never broken well dry	Yes,	Uncertain once	
21	No	3 yrs	No gargoulette	No	3 yrs	Well not deep enough	Yes,	Uncertain	
22	Yes	1 week	No gargoulette	P	1 week	Partial maintenance	Yes,	Once/year	More diarrhea before well fixed no longer put javel in water
23	Control								
24	No	2 mo	Pop believed it was disinfected every week, but it was not	P	2 mo	Just fixed one of the two pumps	No		Diarrhea common before & after well improvement, don't believe one can get sick from water
25	No	4 mo	No gargoulette	No	4 mo	Vandalized was maintained in past	No	--	--
26	No	7 mo	Women said brackish, no garg	No	7 mo	Broken for 2 months	Yes	Unknown	--
27	Control								
28	Yes	2 wks	Gargoulette in well	Yes	2 wks	Broken once and fixed	Yes	Unknown	Didn't believe sickness could come from water

Have they been recently disinfected?				Have they been maintained?			Have they been visited by Health Ed. Team?		
	Yes/No	Time since last disinfected	Comment	Yes/No or Partial	Date last visited	Comment	Yes/No	Date last visited or how often	Comment
29	No	1 mo	Women believed it was done every week	Yes	1 mo	Repaired	No		Said diarrhea less frequent after well improved
30	No	1 mo	No gargoulette	P	1 mo	Broken for one year before repaired	No		Believed less diarrhea after well improved
31	Yes	1 wk	No gargoulette	Yes	8 mo	Had been repaired	Yes	3 mo	Sickness could come from water before but not after well fixed
32	No	1 mo	No gargoulette	No	7 mo	Simple maintenance needed (washers in faucet) guardian should be doing it	Yes	1/mo	Team came but just stayed at well didn't go into house
33	Yes	1 wk	Done by guardian once a month no gargoulette	No	Never	Not needed before but needed now	No		Not as much diarrhea as before
34	No	1 mo	Gargoulette but improperly used	No	1 mo ?	Vague answer	No		Don't use javel because govt puts it in the well
35	Yes	2 wks	Done by guardian rusty water	P	Recent	Had been broken for one month	Yes	1 yr	Women didn't believe sickness could come from water but men did
9	Yes	Within		5	Yes	Within	1	Yes	
21	No	2-8 wks		15	No	2-5 wks	4	possibly new team	
				1	P		15	No	

	Who's idea to fix this source?	Who fixed the well?	Who paid for improvements?	Who's well now?	How much water taken (in liters)? liters	X-day	How far from home?	Has health of Pop. changed? Yes--1, No--0	No. of Latrines
1	Gov't Officials Foreign Proj Per	Gov't	Not known	Public	10	10	50 m 3 km	1	Several
2	DATA NOT AVAILABLE		N/A	N/A		N/A	N/A	N/A	N/A
3	Gov't Agent Gov't Officials	Gov't Agent	Not known	Public	15	2 3	300 m 1 km	1	None
4	Local Leaders	Gouvernorate	Gouvernorate	Private & Public	15	2 3	Less than 1 km	0	1
5	Gov't	Americans	Government	Public	40	3 4	Less than 2 km	0	Several
6	Control								
7	Arabs and Americans	Arabs Americans	Don't know	Public	15	3 4	1 2 km	0	None
8	Americans	Americans	Americans	Public	15	3 4	½ 2 km	0	None
9	Don't know Foreigners Gov't Official	Don't know Foreigners	Don't know	Public	15	3	800 m	0	Several
10	Private Ind	Workers Tunisians	Gov't	Private	15	3	150 m	0	None
11	Americans	Americans	Americans	Public	20	2	1 km	0	None
12	Local Leaders Gov't Officials	Santé Publique	Gov't	Public	20	2	1 hour	0	None
13	Control								
14	Americans Local Leaders	Americans	Americans	Public Private	40	2	300 m	0	2
15	Local Leaders Proj Personnel	Gouvernorate Foreign Proj Per	Gouvernorate	Public	20	4 5	60 m	0	None
16	Gov't Official	Workers Supervisor	Gov't	Public	15	4	300 m	0	None
17	Americans Government	Americans	American	Private Only	10	10	50 m	0	None
18	Santé Publique	Santé Publique	Gov't	Community	30	2	Less than 1 km	1	1
19	Local Leaders	Santé Publique	Santé Publique	Public	10	1 2	100 m 2 km	1	Several
20	Government Local Leaders	Gov't	Gov't	Private	40	1	Less than 1 km 2 km	0	None
21	CHEIKH For Proj Pers	Foreigners FPP	Don't know	Private Public	40	1	Less than 1 km	0	Several
22	FPP Gov't	SP FPP	Gov't	Private	10	2 5	1 km		None
23	Control								
24	Americans Gov't	Tunisians Gov't	Gov't	Private	30	1	100 m 2 km	0	Several
25	Americans SP	Americans Arabs	American or Gov't	Public	1		10 15 min	1	Few
26	Local Leaders FPP	Americans Tunisians	American Tunisians	Private	30		Less than 1 km	0	1
27	Control								
28	FPP	Gov't	Gov't	Public	10		100 m 1 km	0	None
29	Local Leaders	Gov't	American Gov't	Private Gov't	20	2 3	Less than 1 km		Few
30	FPP Gov't Officials	FPP	Americans Gov't	Private	30	1	300 m 1 km		None
31	Local Leaders Gov't Officials	FPP	Gov't	Community	25	2 3	200 m 4 km	1	Very few
32	Local Leaders	FPP Gov't	FPP Gov't	Guardian Gov't	50	2 3	5 min 2 hrs	0	Few
33	Gov't Officials Local Leaders	Americans Gov't	Gov't	Community	20	5	100 m 2 km	1	5
34	Local Leaders	Americans	Americans	Gov't Private	25	3	25 m 2 km	0	None
35	FPP	Americans	Americans	Private Public	25	3	50 m-6 km	0	None
	Local – 12 Gov't 13 American – 7	Gov't – 10 American 11	Gov't – 16 American 10	Public – 17			25 m-6 km	8 – Positive Change 1 – Negative Change	14 – One or more latrines

CONTROL SITES VISITED

What sites were visited?			Are they operating?*			Are they being used?			Have they been recently disinfected?			Have they been maintained?			Have they been visited by Health Ed. Team?			Who's idea to fix this source?
Gouvernorate/ Delegation	Site	Well/ Spring (M=Motor-ized)	Fully closed system Yes/No	For wells pump works Yes/No	Repairs Needed	Est No of Daily Users	Est LPCD H_2O Use	Seasonal Variation Dry Season Use	Yes/ No	Time since last dis-infection	Comment	Yes, No or P	Time since last visit	Comment	Yes/ No	Time since last visit or how often	Comment	
6 Bizerte/ Sedjan	Ain Chabat El Hout	S	No	NA	Pipeline	300	4-6	Only used in summer	No	Never	Not on S P Schedule	NA	NA	—	No	Never	—	Don't know
13 Bizerte/ Sedjàn	Bir Ouled Salem	W	No	NA	NA	100	11-15	Dry in summer	No	Never	—	NA	NA	—	No	Never	—	Gov't
23 Jendouba/ Jendouba	Bir Saida	W	No	NA	NA	?	14	Only used in summer	No	8 mos	Disin-fected by S P in summer when used	NA	NA	—	Yes	?	—	Local Leaders Gov't Officials
27 El Kef/ Ksour	Bir Bit El Hadj Salah	W	No	NA	NA	300	20	None	No	1 yr	Not on S P schedule	NA	NA	—	Yes	?	Health Team only came once	Local Leaders

*Repair questions generally not applicable (NA) since sites were not improved mechanically

Control No.	Who fixed the well?	Who paid for improvements?	Who's well now?	How much H_2O taken in liters	X/Day	How far from Home?	Has health changed Yes=– No=0	No of Latrines	Comment
6	Tunisians	Gov't	Public	15	2-3	1, 2-2 km	NA	None	—
13	Tunisian Macon	Don't know	Public	15-20	3	150 m-2 km	NA	None	Well currently under construction
23	Gov't	Gov't	Gov't	10-20	4-5	100 m-4 km	NA	Several	—
27	Gov't	Gouvernorate	Private	20	2-10	100 m-[illegible] km	NA	Few	—

APPENDIX B

A CHRONOLOGY OF CARE/TUNISIA WATER PROJECTS

ATTACHMENT B

CARE TUNISIA WATER PROJECTS

YEARS	TITLE USED BY CARE	ACTIVITIES	APPROXIMATE FUNDING (000 $ U.S.)		SOURCE/COMMENT
1970	El Kef I (Pilot)	8 wells renovated in Makhtar Delegation	20*	CARE	Completed
1972-1973	El Kef II (240 Wells)	243 wells and springs renovated in 11 delegations; Demster and UNICEF hand pumps installed	178	AID	P.L. 480-Section
			20*	CARE	204 funds
			67	MOPH	
			90	GOEK	Completed
			120	P.C.**	
1974	Bizerte Wells I	60 wells and springs renovated in 4 delegations; wooden hand pumps with 1-13/16" cylinders installed; MOPH maintenance team trained for Bizerte region	50	AID	204 funds
			40	CARE	
			59	MOPH	Completed
			34	GOB	
			79	P.C.**	
1974-1975	Sfax Wells	30 wells renovated and reservoirs constructed in delegations; Godwin hand pumps and HATZ diesel powered pumps installed	24	AID	204 funds
			20	CARE	
			42	MOPH	Completed
			45	GOS	
			75	P.C.**	
1975-1976	El Kef III (Wells Maintenance Training	2 MOPH mobile maintenance teams trained	19	AID	204 funds
			3	CARE	
			56	MOPH	Completed
			27	P.C.**	
1975-1976	Bizerte Wells II	93 springs constructed, 7 wells renovated and equipped with wooden hand pumps; MOPH maintenance team trained for M. Bourguiba region, mobile education team formed.	146	AID	OPG
			16	CARE	664-0286
			99	MOPH	
			84	GOB	Completed
			41	P.C.**	

ATTACHMENT
CARE TUNISIA WATER PROJECTS

YEARS	TITLE USED BY CARE	ACTIVITIES	APPROXIMATE FUNDING (000 $ U.S.)		SOURCE/COMMENT
1976	Bizerte Wells III	10 springs constructed, 10 wells renovated and equipped with wooden handle hand pumps	8	AID	OPG
			8	CARE	664-0286
			5	MOPH	
			36	GOB	Completed
			9	P.C.**	
1976-1977	Kairouan I Wells/ Rural Hygiene	5 wells renovated and reservoirs constructed, 5 motor-powered pumps installed	10	CARE	Completed
			30	MOPH	
			59	GOK	
			44	P.C.**	
1976-1978	El Kef IV (Wells Maintenance/Latrine Construction)	100 old project wells and springs repaired and equipped with wooden hand pumps with 2½" cylinder; one maintenance team re-trained; one education team trained ; about 100 demonstration latrines constructed	45	AID	OPG
			10	CARE	664-0288
			110	MOPH	
			75	GOEK	Completed
			57	P.C.**	
1977-1978	Siliana I (Wells/ Rural Hygiene) (Maktar and Rohia delegations)	50 wells and springs constructed 30 wells from old project repaired and equipped with wooden hand pumps with 2½" cylinder; maintenance and education teams trained; about 150 demonstration latrines constructed	316	AID	OPG
			32	CARE	664-0299
			136	MOPH	
			79	GOS	Completed
			21	P.C.**	
1977-1978	Kairouan II Wells/ Rural Hygiene	25 wells renovated and diesel powered pumps installed; maintenance and education teams trained; about 100 demonstration latrines constructed	365	AID	OPG
			20	CARE	664-0298
			66	MOPH	
			82	GOK	Completed
			60	P.C.**	

ATTACHMENT
CARE TUNISIA WATER PROJECTS

YEARS	TITLE USED BY CARE	ACTIVITIES	APPROXIMATE FUNDING (000 $ U.S.)		SOURCE/COMMENT
1978	Kasserine I (Pilot)	1 spring capped and 1 well renovated and equipped with hand pump	20	CARE	Completed
1979-1980	Bizerte IV (Sedjenane) Rural Potable Water	40 wells and springs renovated; wood hand pumps installed with 2½" cylinder; 2nd maintenance team trained for M. Bourguiba region; education team re-formed	189 17 45 70 42	CIDA CARE MOPH GOB P.C.**	On-going
1979-1980	El Kef V Rural Hygiene	35 wells renovated and equipped with wooden hand pumps with 2½" cylinders; 5 wells renovated, reservoirs constructed + diesel-powered pumps installed; 2nd education team trained; 400 latrines constructed	405 20 75 80 57	AID CARE MOPH GOEK P.C.**	OPG 664-0313 On-going
1980-	Siliana II Rural Hygiene	40 wells and springs to be renovated; hand pumps to be installed on wells; 10 wells equipped with reservoir and diesel powered pumps	661 20 55 149 21	AID CARE MOPH GOS P.C.**	OPG On-going
1980-	Kairouan III Rural Hygiene	61 wells to be renovated; reservoirs built, and diesel-powered pumps installed	1,352 233 233	CARE*** MOPH GOK	On-going

ATTACHMENT
CARE TUNISIA WATER PROJECTS

YEARS	TITLE USED BY CARE	ACTIVITIES	APPROXIMATE FUNDING (000 $ U.S.)		SOURCE/COMMENT
1980-	Kasserine II Rural Hygiene	95 wells and springs to be renovated; 5 wells renovated and equipped with reservoir and diesel-powered pump; remaining wells to be outfitted with hand pumps; maintenance and education teams to be trained	1,050	AID	OPG 664-0312.14
			240	CARE	
			407	GOT	
			40	P.C.**	On-going

* Estimated additional overhead or other costs to CARE not otherwise budgetted in grant agreements.
** Based on an estimated average of $1,000 per volunteer month.
*** Funding in this amount has been requested of CIDA.

APPENDIX C

CRITERIA FOR WELL/SPRING SITE SELECTION

CRITERIA FOR WELL/SPRING SITE SELECTION

These are the criteria used by CARE in selecting sites for improvements. They are reconstituted here based on explicit statements in CARE reports and implicit elements of CARE's selection process. All were existing sites in need of repair or reconstruction.

A. Projects involving handpump installation or spring capping (in order of importance)

1. Population currently relying on water point as primary source of drinking water (based on observations of person conducting pre-project site survey and estimates of users interviewed): theoretical minimum - 100 beneficiaries; theoretical maximum - 500 beneficiaries.

2. Capacity of source to provide adequate supply year round, (based on information provided by users).

3. Absence of permanent visible sources of contamination, (based on observation).

4. Suitable location for construction available, i.e., not easily susceptible to damage from natural causes, sufficient slope for springs to flow, (based on observation).

5. Year round accessibility of well site via Land Rover to ensure maintenance requirement, (based on observation).

6. Accessibility of site via tractor for delivery of construction materials.

7. Depth of well not exceeding 30 meters.

8. Equitable distribution by délégation and by cheihkat.

9. Chemical acceptability of water (based on users' opinions).

10. Well casing structurally sound.

B. Projects involving diesel-powered pump installation

1. Non-existence of pump and reservoir system.

2. Population currently relying on well as primary source of drinking water: theoretical minimum - 500 beneficiaries; theoretical maximum - 2,000 beneficiaries.

3. Capacity of source to provide adequate supply year round, (based on tested recharge rates).

4. Chemical acceptability of water, (based on chemical analyses).

5. Absence of permanent visible sources of contamination, (based on observation).

6. Suitable location for construction available, i.e., not easily susceptible to damage from natural cuases, (based on observation).

7. Year round accessibility of well site via Land Rover to ensure maintenance requirement, (based on observation).

8. Accessibility of site via tractor for delivery of construction materials.

9. Depth of well not exceeding 60 meters.

10. Equitable distribution by délégation and by cheihkat.

11. Well casing structurally sound.

APPENDIX D

CARE WATER PROJECT COSTS

APPENDIX D

CARE WATER PROJECT COSTS

(APPROXIMATE FUNDING IN 000 U.S. $)

PROJECT	SOURCES					PROJECT TOTALS
	AID	CARE	MOPH	GOVERNORATE	PEACE CORPS[a]	
Bizerte 1975-76	154	24	103	120	50	451
El Kef 1976-78	45	10	110	75	57	297
Kairouan 1977-78	365	20	66	82	60	593
Siliana 1977-78	317	32	136	79	21	585
Funding Source Totals	881	86	415	356	188	Grand Total 1,926

a/ Volunteer services, estimated at $1,000 per volunteer month.

APPENDIX C

CARE WATER PROJECT COST PER IMPROVED SITE

APPENDIX E

CARE WATER PROJECT COSTS PER IMPROVED SITE

PROJECT	TOTAL COST ($000) (a)	NUMBER OF SITES IMPROVED (b)	AVERAGES ($000) (a)/(b)
Bizerte	451	120	3.8
El Kef	297	100[a/]	3.0
Kairouan	593	25	23.7
Siliana	585	80	7.3
Totals/ Average	1,926	325	5.9

a/ These sites already had been improved in an earlier CARE project.

APPENDIX F

ESTIMATED ANNUAL RECURRENT BUDGET COSTS FOR MAINTENANCE TEAM MAINTAINING 100 WELLS

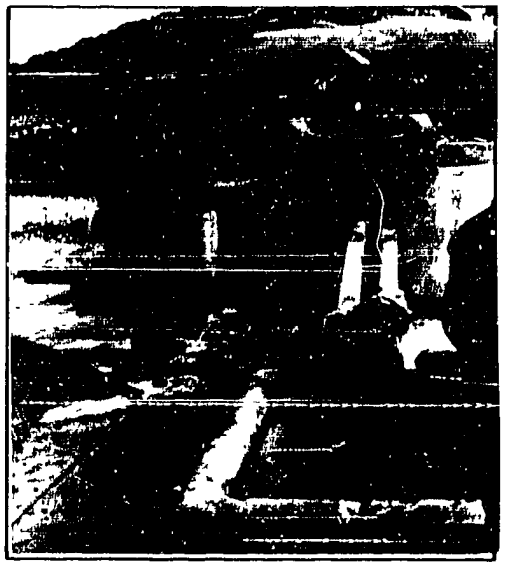
APPENDIX F

Estimated Annual Recurrent Budget Costs of one Maintenance Team maintaining 100 wells

		TD	$
Salaries			
Driver	- 12 months x 90.000 =	1080.000	2,700.00
Sanitary Tech.	- 12 months x 75.000 =	900.000	2,250.00
Pump Repair	- 12 months x 75.000 =	900.000	2,250.00
Other Costs			
Diesel Fuel	- 40Lx.07$\frac{1}{2}$x240 days =	720.000	1,800.00
Javel	- 4L x 12 months x 100 wells x .080 =	384.000	960.00
Replacement Gargoulettes	- .800 x 100 =	80.000	200.00
Vehicle Maintenance	- 100.000 per month x 12 =	1200.000	3,000.00
Vehicle Depreciation (over 5 yrs) per yr.	=	1200.000	3,000.00
Spare Pump Parts	- 15.000 x 100 =	1500.000	3,750.00
		7,964,000	19,910.00

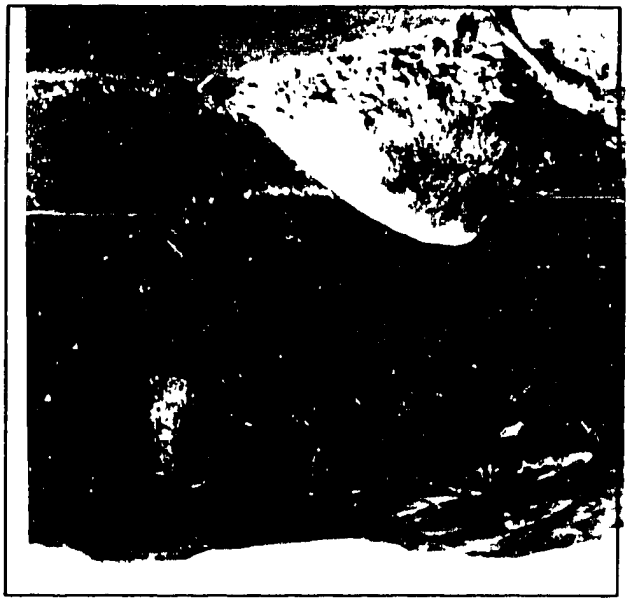
APPENDIX G

PHOTOGRAPHS



Interviewers wait for women to arrive at the well The trough is often used for laundry

An interviewer asks about a well site where one of the pumps is missing a handle, and the hatch covering the well opening is gone



The population is widely dispersed in the mountainous northwestern areas of Tunisia Thatched stone and mud houses are common, and the usual source of water is a mountain stream

To the south are the arid plains of Kairouan, where the only sources of water are deep wells Small villages are close by

A team member and villagers discuss the mechanized pumps and pump house installed over a deep well

Well sites are usually crowded in the villages of Kairouan and appear to be central gathering places ***Gargoulettes*** *are propped against the spigots until full*

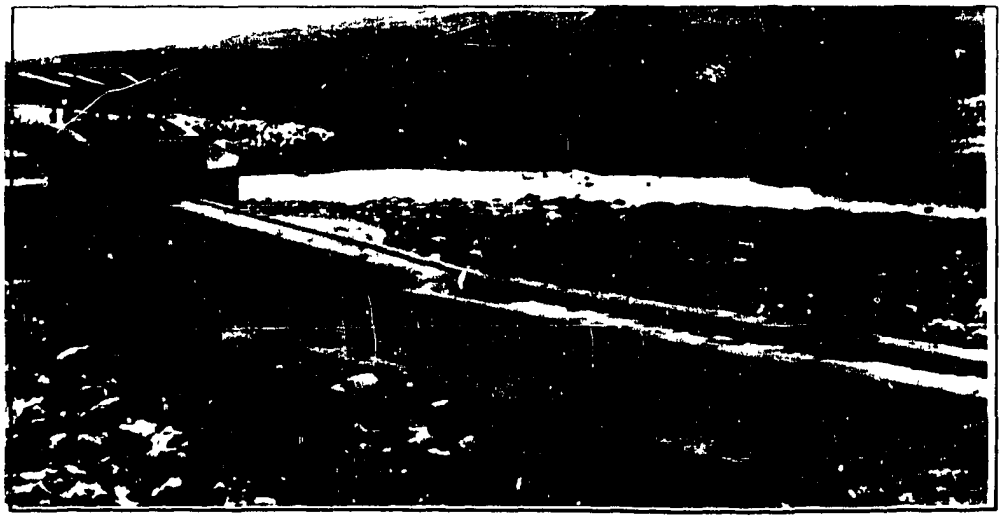
Springs were improved at 139 sites so that the water would flow through a pipe and into a concrete trough

*The team inquires about the concrete "**captage**" which has been chipped away exposing the spring below to contamination*

Existing hand dug shallow wells were improved at 186 sites. The project did not include digging new wells

*With [illegible] "**gargoulettes**" [illegible]*

gargoulette [illegible]



On shallow wells improvements included a concrete base one or more hand pumps and a trough for animals

SPECIAL STUDIES

No. 1: The Socio-Economic Context of Fuelwood Use in Small Rural Communities (August 1980)

No. 2: Water Supply and Diarrhea: Guatemala Revisited (August 1980)

PROGRAM DESIGN AND EVALUATION METHODS

Manager's Guide to Data Collection (November 1979)