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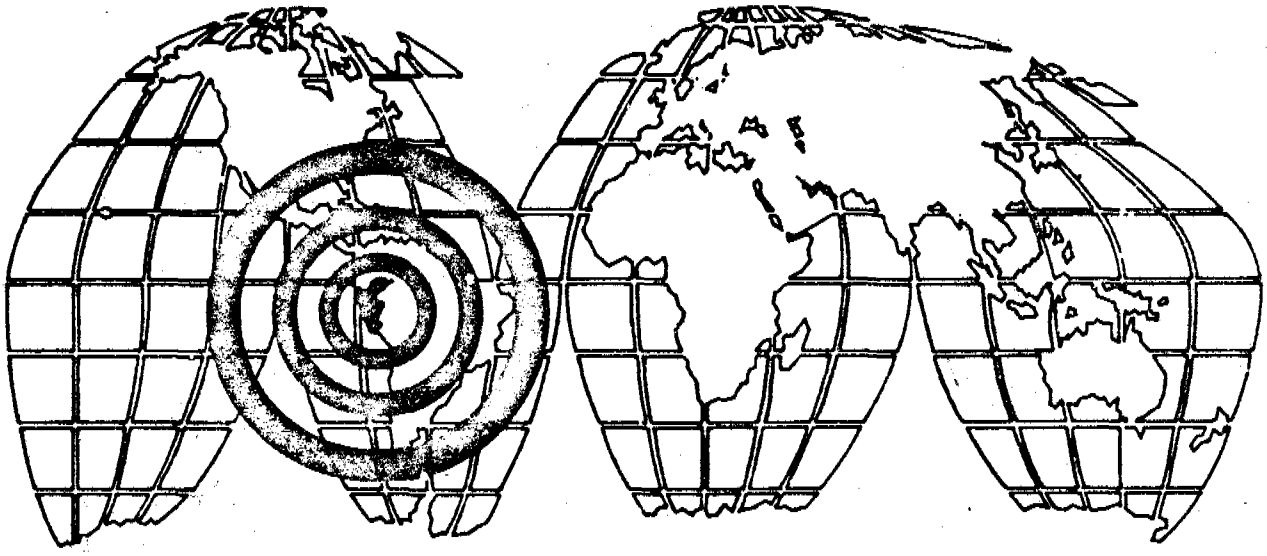

October 1981

U.S. Agency for International Development (AID)

PN-AAJ-176

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PROJECT IMPACT EVALUATIONS

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No. 2: Kitale Maize: The Limits of Success (May 1980) PN-AAH-723
No. 3: The Potable Water Project in Rural Thailand (May 1980) PN-AAH-850
No. 4: Philippine Small Scale Irrigation (May 1980) PN-AAH-749
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No. 8: Morocco: Food Aid and Nutrition Education (August 1980) PN-AAH-851

(continued on inside backcover)

PERU: CARE OPG
WATER HEALTH SERVICES PROJECT

PROJECT IMPACT EVALUATION NO. 24

BY

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AGENCY FOR INTERNATIONAL DEVELOPMENT

October 1981

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FOREWORD

In October 1979, the Administrator of the Agency for International Development initiated an Agency-wide ex-post evaluation system focusing on the impact of AID-funded projects. These impact evaluations are concentrated in particular substantive areas as determined by A.I.D.'s most senior executives. The evaluations are to be performed largely 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 A.I.D. Peru: CARE OPG Water Health Services Project was conducted in December 1980 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.

EXECUTIVE MMARY

As part of A.I.D. efforts to assess the impact of its assistance in a number of development sectors, an interdisciplinary team conducted an evaluation of the rural water supply/health project in Peru in November/December 1980.

The purpose of this project was to improve the sanitation and health well-being of rural villagers living in the highland region of Ancash Department in Peru. The project attempted to implement an integrated development activity combining the construction of water supplies and sewer systems with immunization and health education components. At the time of this evaluation the originally planned number of water supplies and sewer systems had been built and were operating. However, in the meantime, the project had been expanded substantially and many additional systems were under construction. This evaluation focussed on systems that had been in operation for over one year. While it is too early to study the long-term impacts of the project, there was enough operating history and evidence to permit the drawing of some conclusions and recommendations.

The project was planned and managed by CARE. The Organization for the Reconstruction and Development of the Earthquake Zone (ORDEZA) designed and built with help from villagers, the water supplies and sewer systems. The Ministry of Health (MOH) provided related health services to the project. A.I.D.'s role consisted of funding the foreign exchange cost of construction materials, providing technical assistance and project monitoring.

The most successful component of the project was the installation of gravity water supplies. In the villages served, house connections were provided to practically all of the people who wanted piped water. The gravity-fed piped water systems built require no fuel or energy to operate and are the most appropriate type where hydrologic conditions permit. There are many more villages in Peru that need these systems.

Spring-fed gravity systems were used in earlier projects and were found to be the simplest and cheapest to build, operate and maintain. Rural villagers have been able to meet their day-to-day operation and maintenance needs, however, for the long-term there is a need for technical supervision.

The fewer sewer systems built markedly improved the household sanitation of the limited number of villagers who could afford to hook up to them. However, many villagers could not afford the investments necessary to take advantage of the services.

The capital cost ($20.25 per capita) of the water systems appear to make them a reasonable development investment. On the other hand, sewer systems require so much capital and labor that they do not now appear to be a worthwhile investment in rural villages.

The health education components, especially the movies, were received enthusiastically by the villagers but did not appear to have made any impact. CARE's attempt to measure the health impact of the project had not been completed but, because of faulty research design, probably will not provide sufficient evidence to achieve its goal.

The installation of piped water supply systems with house connections had its greatest impact on women and children. Women were saved an average of three hours of work daily by having a water faucet in the patio. Most of the women spent the extra hours on household chores and productive work. Some of these activities save the villagers money while others have income potential.

With more water readily available, women reported an overall improvement in household sanitation. Village schoolteachers also noted that with water piped to the homes, they were able to apply improved personal hygiene standards among school children.

Although the project evaluated is small, the lessons learned from it are applicable to the rural water supply and sanitation sector in general.

Lessons Learned

1. The development process often generates institutional changes which upset the status quo and creates interagency conflicts. These conflicts interfere with project implementation, especially if the project involves more than one host country agency. Project planners should take into consideration the disruptive impact that bureaucratic conflicts can have on development projects.

2. Where water supplies are a top priority, their installation can be justified solely on the basis of improving water quality, quantity and accessibility with the understanding that they will assist in improving health.

3. PVO's are a valuable resource in planning and implementing specialized development projects where they have the necessary professional and technical staffs that can manage them competently.

4. Because of the complexities involved, perfunctory attempts to measure the health impacts of a project whose main purpose is to provide drinking water will not produce conclusive data and should not be funded.

5. Imported materials tend to become the limiting element in development projects and produce rigidities in project design and implementation. They may also cause maintenance and repair problems. To enhance the sustainability of projects and to support the development of local industries, the use of local construction materials should be encouraged even where their initial cost is greater than U.S. imports.

6. The interjection of "food for work" in development projects where a tradition of voluntary community involvement exists can produce more harm than help. It is better to use the food in truly needy or emergency cases or in programs that address specific problems of malnutrition.

PREFACE

The Rural Water/Health Services Project in Peru is one of several which CARE has implemented or is implementing in developing nations around the world. Two of these, Tunisia and Korea, already have been evaluated. This project was selected for evaluation to provide further information on water supply projects implemented by CARE and also to derive lessons which may be of value in implementing the USAID/Peru sponsored Rural Water Systems and Environmental Sanitation Project which was authorized in 1980.

The evaluation team was composed of two AID/Washington staff and one Peruvian social scientist. The team was assisted by a Quechua-language interpreter who is a resident of Ancash Department, the project target area, and the CARE nutritionist who also speaks Quechua and who was born and raised in the project region. All team members were women except for the team leader and the driver.

ACKNOWLEDGEMENTS

The team expresses its appreciation to the representatives of the Government of Peru and the Pan American Health Organization for their friendly and willing cooperation in providing invaluable project and background information. Special thanks go to Harold Northrup and Dale Harrison of CARE and their staff. The team is especially grateful for the collaboration of CARE staffers Carmen Rosa Cordova, Jose Moreno, and Manuel Alvarado and to interpreter Gloria La Puente who accompanied us on our visits to project village sites.

The team is indebted to Leonard Yeager and his USAID/Lima staff for their assistance and cooperation and especially to Enrique Schroth who served as our official contact with the Mission and who travelled with us to the project area.

Finally, the team wishes to thank all of the citizens of Ancash Department who so graciously suffered our intrusions and questions, and introduced us to Peruvian country hospitality.

PROJECT DATA SHEET

1. COUNTRY: PERU

2. PROJECT TITLE: RURAL WATER HEALTH SERVICES

3. PROJECT NUMBER: 527-0177

4. PROJECT IMPLEMENTATION:

a.	PROJECT PROPOSAL	7/76
b.	GRANT AGREEMENT	8/77
c.	FINAL OBLIGATION	5/80
d.	FINAL INPUT DELIVERED	Project extended to 10/81
e.	FINAL COMPLETION	Original 8/80 Planned 8/81

5. PROJECT FUNDING:

		U.S. Dollars	Peruvian Soles
a.	A.I.D.	$450,000	
b.	G.O.P.	-----	6,500,000*
c.	CARE	$189,000	----
	TOTAL	$639,000	6,500,000

*Note: Equivalent to U.S. $144,444 at exchange rate S/45=U.S. $1.00. GOP contributed an additional S/.12,000,000 on 10/2/79 equivalent to U.S. $48,388 at exchange rate S/248=U.S. $1.00

6. MODE OF IMPLEMENTATION:

a. Grant Agreement between USAID/PERU AND CARE/PERU

b. Project agreement between CARE/PERU AND ORDEZA

7. EVALUATIONS:

a.	Regular Project Evaluation Summary (PES)	4-79
b.	CARE Evaluation Activities	12-78, 7-79, 10-80

8. RESPONSIBLE MISSION OFFICIALS DURING LIFE OF PROJECT:

Mission Director	Leonard Yaeger
Project Officers	Robert Kramer, Program Officer
	Edilberto Alarcon, Chief Engineer
	Enrique Schroth, Sanitary Engineer

9. CARE OFFICIALS:

Director	Dale Harrison
Project Officer	Marco Antonio Campos
Huaraz Representative	Manuel Alvarado
Chimbote Representative	Jose Moreno

COUNTRY DATA SHEET *

Population:	17,869,000 (1980 estimate)
Population in rural areas:	37% (1980)
Annual Growth Rate:	2.9% (1979 estimate)
Crude Birth Rate:	40 births per 1000 population (1979)
Per Capita GNP:	$740 (1978)
Adult Literacy Rate:	73% (1972)
Infant Mortality Rate:	92 per 1000 live births (1975)
Life Expectancy at Birth:	56.5 years (1978)
Population with reasonable access to safe water:	47% (1975)
Exchange Rates:	(Peruvian Soles)

10/76	S/ 45	=U.S. $1.00
12/77	S/ 116	=U.S. $1.00
12/78	S/ 208	=U.S. $1.00
12/79	S/ 248	=U.S. $1.00
12/80	S/ 330	=U.S. $1.00

*Source: AID Congressional Presentation FY 1982 Annex III Latin America and the Caribbean.

GLOSSARY

A.I.D.: Agency for International Development

CARE : Cooperative for American Relief Everywhere, Inc.

CARITAS: Catholic Relief Services (in Latin America)

CPAP: Committee for Potable Water

CRYRZA: Commission for the Reconstruction and Rehabilitation of the Zone Affected (by the 1970 earthquake)

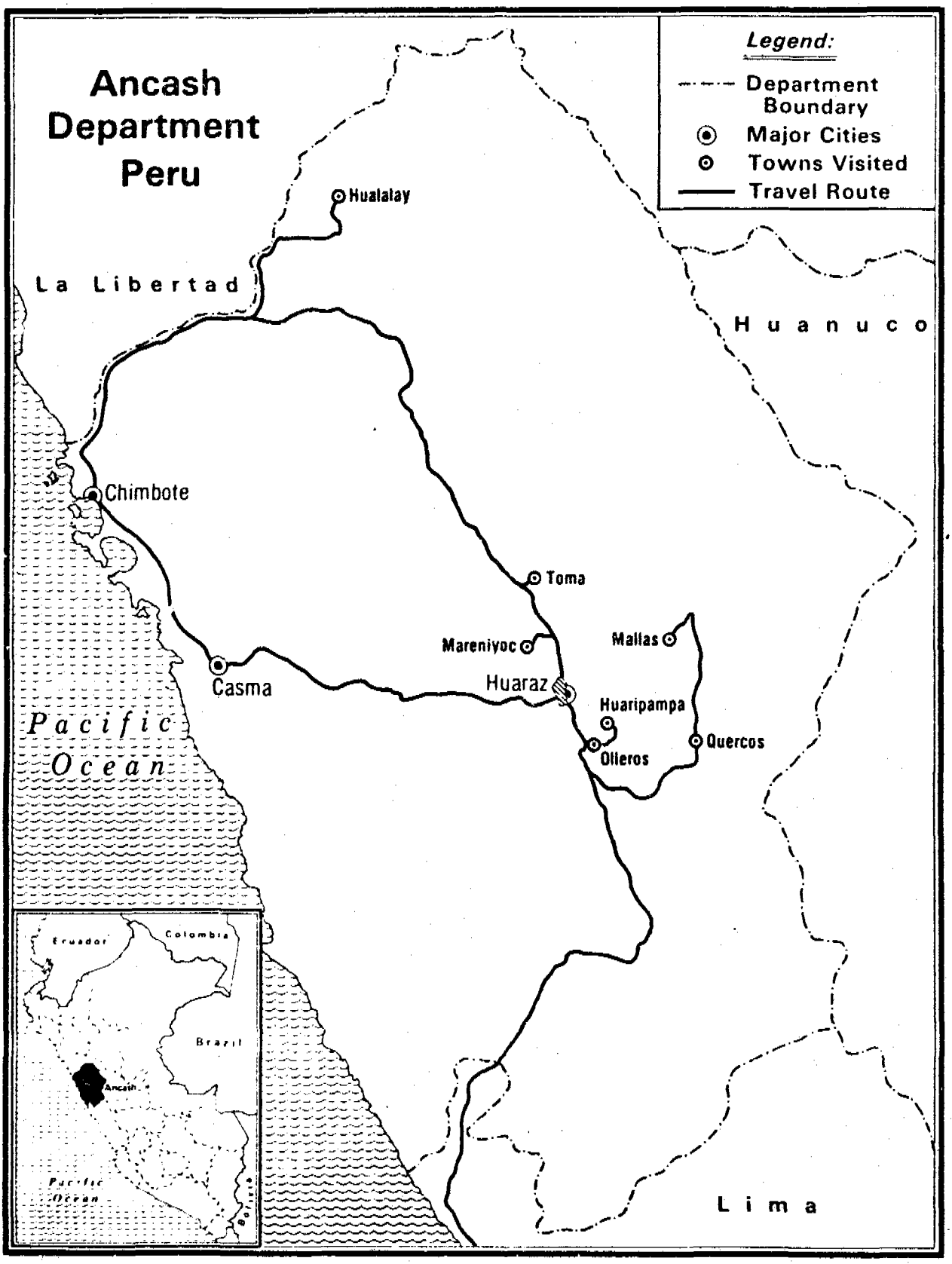
GOP: Government of Peru

MOH: Ministry of Health

ORDENOR-CENTRO: Regional Development Organization for North-Central Peru (successor to ORDEZA)

ORDEZA: Organization for the Reconstruction and Development of the Affected Zone (Successor to CRYRZA).

PNAPR: National Rural Potable Water Plan


Ancash
Department
Peru
Legend:
Department Boundary
Major Cities
Towns Visited
Travel Route
Hualalay
La Libertad
Huanuco
Chimbote
Toma
Mareniyoc
Mallas
Casma
Huaraz
Huaripampa
Quercos
Olleros
Pacific
Ocean
Lima
Ecuador
Colombia
Brazil
Ancash
Pacific Ocean
Bolivia

I. PROJECT SETTING

A. The Problem

The Government of Peru (GOP) has had a long history of involvement in the rural water sector. In the early 1960's it recognized the need and began to develop a nationwide plan to build water supplies in rural villages. In early 1964 the GOP launched the first National Rural Potable Water Plan (the Plan) which was to provide piped water to rural villagers. During the past 16 years, the "Plan" has installed water supply systems in 779 rural villages. In spite of its significant accomplishments, the "Plan" only begins to satisfy the water needs of the rural population. Most of the 16,550 villages with populations under 2,000 reported by the Ministry of Health (MOH) in 1980 still do not have water supply systems. From the beginning of the "Plan", the MOH received many more requests for water systems than it had resources to build. During the 1970's, a national economic crisis forced the GOP to drastically cut its operating programs and further reduced the ability of the MOH to respond to the growing demand.

In Ancash Department, the site of the CARE project, 59 per cent of the population is rural. In 1980, the regional health officials reported the following statistics all of which are worse than the national averages: crude birth rate of 47.8 per 1,000 population, infant mortality of 157 per 1,000 live births, life expectancy at birth of 53 years, only 17 percent of the population have access to piped water, and less than 1 percent have latrines. Of the hundreds of villages under 2,000 population in Ancash Department only 37 received water supplies under the "Plan". Many villages had submitted their requests for water supplies years ago and are still waiting for their systems.

B. The Target Population

CARE identified the target population for this project as those living in rural highland villages of Ancash Department having a population of less than 2,000 people, lacking an adequate water supply, and /or sewer system, and falling in the lower half of USAID/Lima's Poverty Index. This meant that most of the several hundred Andean villages in the Department were eligible to participate in the project.

Because of the remoteness of the region, life is difficult in these villages. The large majority of the people who live in these villages are subsistence farmers whose main crops are potatoes, grain, beans, and maize. They own and work tiny parcels of land scattered on the sides of adjacent mountains. They live in small tile-roofed adobe houses usually consisting of one or two rooms with dirt floors. Cooking is done under a lean-to at the back of the house. The back yard is often fenced in and contains a corral for domestic animals and a small vegetable garden. The women, most

of whom are illiterate and only speak Quechua, do all of the child-rearing and household chores and spend an average of three hours a day carrying water. The men work the land by hand or with oxen from early morning until late afternoon. They own no mechanical equipment. When weather permits, women herd their livestock, usually a flock of sheep or a cow, on fallow land often while carrying a baby on their backs and spinning yarn from hanks of raw wool. Although the women weave and knit clothes and accessories for the family, it is usually the men who produce woven goods to sell.

Some of the villages are accessible all year by gravelled roads, but many are often cut off from the outside world by floods and landslides, especially during the rainy season. The typical small highland village eligible to participate in this project has no post office or other communications service, no electricity, health facility, drugstore, boarding house, restaurant, cinema, or public market. They usually have a church and at least a one-room school manned by a school teacher from the city. The school teacher is often times the only link the villages have with the outside world. He/she usually performs a key role as motivator, supporter and spokesman for the local leaders in carrying out community projects. Andean villages have a tradition of communal organization, independent of the formal government administrative structure, which collects nominal fees and executes a wide variety of public works.

C. Sector Organization and Project Administration

Historically, Peru had four levels of government: national, departmental, provincial, and local. After the devastating earthquake that struck Ancash Department in 1970, killing thousands of people and destroying or damaging much of its physical infrastructure, the National Government created an autonomous regional commission, Commission for the Reconstruction and Rehabilitation of the Earthquake Zone (CRYRZA), to manage and coordinate the disaster relief and reconstruction activities in Ancash Department. CRYRZA worked directly with local authorities bypassing the departmental and provincial levels of government. This commission was superseded in 1973 by Organization for the Reconstruction and Development of the Earthquake Zone (ORDEZA).

When ORDEZA was created, it was given the mandate to take over the operational programs of the old line Ministries. In the case of the MOH, this meant that it lost the rural water supply construction program it had traditionally managed. The new arrangement deprived the MOH of its engineering staff but left it with the responsibility for the operation and maintenance of rural water supply systems. This reorganization produced interagency conflicts that hampered implementation of this project.

By the mid-1970's, with the nation experiencing its worst modern economic crisis and cutting back on operating budgets, ORDEZA was faced with a growing backlog of projects and less money to build them. In early 1976 ORDEZA asked CARE to help build rural water supplies. This request formed the basis for the CARE Rural Water/Health Services Project.

Although the project was partially funded through an AID/CARE grant agreement, (see Appendix C for Project Budget) the official Peruvian project agreement was signed between CARE and ORDEZA. AID provided partial funding, technical assistance and project monitoring. Since ORDEZA had complete operational autonomy in the region and dealt directly with village administrations, this project could be implemented without involving the top three levels of government. This arrangement allowed CARE, as project manager, also to deal directly with villagers thereby simplifying project administration immensely. The organigram in Appendix D shows how the project was structured.

II. PROJECT DESCRIPTION

A. Project Purpose and Components

The purpose of this project was to improve "the sanitation and health well-being" of rural villagers living in the highland region of Ancash Department. Twenty water supplies and four sewer systems were to be built on a self-help basis. These construction components were to be complemented with health education and vaccination campaigns. (See Appendix E). The success of the project was to be measured by comparing the results of health surveys made in selected villages before and after the installation of the water supply and/or sewer systems.

Two types of piped water supply systems were to be built. Both types were simple gravity systems requiring no pumping and both had household connections. (See Appendix F). A few of the smallest systems however had public faucets instead of household connections. The simpler design would tap perennial springs and have no treatment facility. The second type would divert water from irrigation ditches and include sedimentation tanks and filters to treat the water. The hardware installed, i.e., gate valves, pressure- reducing valves, and faucets, was simple and durable. The intake structure, pressure-reducing chambers, and storage tanks were to be built of reinforced concrete and the pipelines were to be of polyvinyl-chloride (PVC) pipe imported from the U.S. Both types of systems would use standard designs developed in the National Rural Potable Water Plan with the exception that no chlorination was to be included. The project design made no provisions for drainage of waste water nor for training of villagers in operation and maintenance of the systems.

The sewer systems were to be simple gravity systems using concrete pipe manufactured in Peru. No treatment facilities were to be provided; the raw sewage was to be discharged into a convenient, natural drainage.

The health education activity was to focus on food handling and preparation, sanitation, nutrition, and personal hygiene; the vaccination program was to provide immunizations against various communicable diseases; and the evaluation was to measure changes in morbidity and mortality due to water-borne and related diseases resulting from the project.

B. Project Strategy

The project was to be funded by CARE, ORDEZA, and AID; managed by CARE and implemented by ORDEZA. CARE was to maintain a sub-office in the departmental capital, Huaraz, in order to collaborate closely with the ORDEZA headquarters staff there. CARE would be responsible for purchasing and transporting construction materials and in assisting the MOH in the design and delivery of the health education and vaccination campaigns.

ORDEZA would provide professional and technical manpower to design and build the water supply and sewer systems, and the villagers would supply volunteer labor, local materials, and a cash contribution for the construction of the systems.

CARE in consultation with ORDEZA was to select project sites from among candidate villages that had demonstrated interest in participating in the project, e.g., willingness to establish a community administrative junta to be responsible for operating and maintaining the system; and willing to actively contribute in defraying a portion of project costs by providing local materials, labor, and a cash contribution.

When a village meeting these criteria was selected, authorities in the village were notified and asked to call a town meeting. At the meeting, CARE and ORDEZA representatives described the project to the villagers, outlined the roles of each party and reconfirmed the village commitment to make their contributions. A special Potable Water Committee (CPAP) responsible for providing and coordinating all local support for the construction phase was named and organized during this meeting. Once these arrangements had been made, ORDEZA sent out a topographic team to survey the site and collect basic engineering data. This field data was used by the engineering office in Huaraz to design the systems.

When the design was completed, ORDEZA hired a foreman and sent him out to the village to organize village participation and begin construction. ORDEZA engineers would visit the site during construction to provide supervision, the CARE engineer would also visit the construction site periodically to monitor progress and to identify problems. When the construction was completed, the ORDEZA engineer would inspect the system and certify that it was functioning properly. The villagers then assumed responsibility for the operation and maintenance of the system.

C. Project History

Although the AID grant agreement with CARE was signed on August 26, 1977, and the CARE/ORDEZA agreement on October 3, 1977, the first con-construction activity did not begin until mid-1978 because of delays in the procurement of the U.S. pipe. (See Appendix G for Project Chronology). As soon as the pipe began to arrive, ORDEZA was able to start construction

immediately because it had a backlog of water supply projects which had been designed by the MOH under the National Rural Potable Water Plan. By the end of 1978, all 20 water supplies and three sewer systems were under construction, and, in fact, three water systems had been completed. By early 1979, CARE and ORDEZA realized that they had grossly overestimated the quantity of pipe needed to build the 20 planned water systems. Faced with an over-supply of pipe and a backlog of requests, CARE asked and received authorization from AID in April 1979 to expand the project and extend its life. In October 1979, an extension of the CARE/ORDEZA agreement was signed, increasing the number of water supplies to 75 and sewer systems to seven. This agreement also provided for an additional contribution from ORDEZA of S/12,000,000 and extended the life of the project to September 30, 1981. AID also approved the extension of the project but did not provide additional funding.

Although the project encountered problems with the supply and transportation of construction materials, many water supply systems were built with the help of the villagers in record time. At the time of this evaluation, a total of 29 had been completed and there were 22 under construction. On the other hand, the MOH had accepted regulatory responsibility for the operation and maintenance of only six of the completed systems.

The installation of sewer systems turned out to be a major implementation problem for the project. Although at the outset many of the villagers were enthusiastic about building the systems, because of the inordinate amount of labor required to dig the trenches, their enthusiasm evaporated quickly as construction got underway. As a consequence, these projects had great difficulty in recruiting and keeping volunteer labor and experienced long construction delays. In spite of these problems, five systems have been built under this project and, two were still under construction.

The three other components of the project -- health education, vaccination, and evaluation -- ran into serious implementation difficulties. While it would have been easy to blame this on the government's budget crisis, a closer look at the project's history revealed another bureaucratic problem. Inter-agency discord between the MOH and ORDEZA delayed and changed the implementation of these components. As a consequence, the vaccination campaigns were dropped and the health education component was modified. Instead of the bi-monthly visits to all villages by two health educators as originally planned, only three health education campaigns were conducted in 13 villages. Multidisciplinary teams drawing their members from the MOH, ORDEZA, and CARE visited from 10 to 13 selected villages on three different occasions to carry out the combined activities. The health education campaign was carried out during the field visits made by the multidisciplinary teams and consisted of health talks, movies or slides. (See Appendix H for Multidisciplinary Team Activities.)

To evaluate the health impact the project had on the villagers, the multidisciplinary teams carried out parasite, nutrition, and diarrhea studies shortly before and 5 to 6 months after the installation of water supplies and/or sewer systems in these villages. The collected data had not been fully analyzed at the time of this evaluation but due to the overwhelming problem of controlling the innumerable factors which affect villagers' health, it is unlikely that the CARE study will produce useful results.

III. PROJECT IMPACTS: FINDINGS AND ANALYSIS

A. Data Collection

The evaluation team reviewed CARE and AID project documents, conducted interviews and visited five villages with completed water supply systems that had been in operation for a least one year and one sewer system that had been operating for nine months. The team also visited a water system under construction for comparison purposes. At each site the team inspected the water and sewer systems, interviewed village officials and villagers who had worked on the systems, and conducted 50 interviews with women regarding their perceptions about the project. (See Appendix A, Methodology.)

B. Findings

The project component that made the greatest impact on the lives of the villagers was the installation of water supply systems. Based on the information collected, 27 of the 29 systems built are operating satisfactorily. Of the two that are not, one has a sand filter that is not filtering the water adequately and the sedimentation and filtration tanks are not functioning in the other. (See Appendix I for data on completed systems.)

However, there have been a variety of problems. (See Appendix J for comparative ratings of systems visited.) In one village, the spring flow diminished to such a low rate that plans are being made to change the source of supply. In another village the spring flow diminished during the 1980 dry season forcing many families to revert to their traditional source of river water. Some systems experienced pipeline failures but these have been repaired by the villagers themselves. In making these repairs, the villages discovered that the pipe available locally did not exactly match the imported pipe. They had to heat and force fit the connections. There is also the familiar problem of dripping faucets. In the worst cases, this problem is being solved temporarily by closing the street service valve.

The installation of sewers had a significant impact on the level of sanitation in most of the households connected to the systems. However, since fewer systems were built and, where they were built, fewer households were connected, the total impact was very small. Of the five systems

completed, three are functioning satisfactorily, however, at the two remaining sites the villagers complained about the raw sewage being discharged.

In Huantar the trunk sewer is reported to discharge raw sewage just one-half block from the nearest home and then flows toward a neighboring village. This situation has produced a serious problem since sewage treatment was not planned or budgeted in the project. At the time of this evaluation, the problem had not been resolved.

Of the other three project components, only the health education and evaluation activities were fielded. Although considerable time and effort were expended in mounting the three field visits by the multidisciplinary teams, there is no indication that the health education component made a measurable impact on health practices nor that the attempt to evaluate project success by measuring changes in health and nutrition levels will produce useful data.

C. Impact on Water Quality

In contrast with the unprotected and untreated water that the villagers got from rivers, springs or irrigation ditches, this project provided clean water from enclosed springs or filtered water from irrigation ditches which was piped directly to their households. The best example of improved water quality was seen in the village of Mareniyoc, where the previous source of supply were small ponds filled once a week with water from the irrigation ditch. The villagers described how the muddy ditch water became stagnant in the ponds and produced a variety of aquatic flora and fauna. They reported that the water smelled and tasted bad. Now the villagers receive a continuous supply of sparkling clear and odorless spring water.

The springs inspected by the team were located from one-half to two kilometers away from the villages. In each case the catchments were protected from direct surface contamination by a concrete spring box. In one case, there was an isolated dwelling located within 100 meters but downslope from the spring. Because the springs were enclosed, they were delivering water of improved quality to the villages.

D. Impact on Quantity and Use of Water

Before the project, the evaluation team estimates that a family of six persons used approximately 40 liters a day for household needs, excluding food processing, laundry and animal watering. The new systems are designed to provide a minimum of 60 liters per person per day. Although an exact assessment of increases in the quantity and types of water use was not possible in this evaluation, the villagers reported using more water than before.

All women interviewed reported using piped water year-round for drinking and cooking except when there was not enough water as in the case of Quercos during the dry season. Bathing practices, however, seemed to vary according to age. While children were bathed once a week, adults bathed less frequently. School teachers noted that children came to school cleaner. They believed this was the biggest impact of the water project.

The evaluation team found that women with smaller families were now doing their laundry at home but women with larger families continued to wash in nearby streams. With larger laundry loads, the bigger volume of water from the river, stream or irrigation ditch made washing and rinsing clothes easier. Another water use mentioned by nearly half of the women interviewed was stock watering. In a few instances, villagers reported using water for gardens and making adobe, although these practices, supposedly, were not allowed by the Administrative Junta.

E. Impact on Women

Before the piped water systems were installed, women worked an average of three hours a day to obtain water. In the typical family, the mother rose before the rest of the family to get water to prepare breakfast and to provide water with which the other members of the family could wash. In the late afternoon, often after a day's work in the fields the women again made the trip for water to cook dinner and, often after preparing and serving dinner, the women had to get more water to wash the dishes.

Now water is piped directly into the living compound eliminating the strenuous and time consuming work of hauling water. The convenience of having a tap in the house enables the women to perform their household work more efficiently. They repeatedly noted how much easier it was for them to carry out their daily tasks and care for the health of their children.

On the average, the elimination of the water hauling task provided some three hours a day of released time for each housewife in the village. Most of the women reported using this time for household chores and child care but a few women said that now they had more time for tending animals and one women mentioned storekeeping. A considerable number of women, however, reported spending more time spinning, weaving and sewing clothes for their families. These activities can represent an important cash savings for the household and can also have income generation potential. The team inspected some of the articles woven by the women and found them to be more attractive in design and higher in quality than most of the handicrafts now being sold in the region. These products are marketable and could become a source of additional income.

An additional benefit not mentioned by the women was the opportunity to actively participate in community functions. In their initial meetings with the villagers the CARE staff emphasized the importance of including

women in every phase of the project. Many women took part in the town meetings and two women were selected as members of the Administrative Juntas. This was a tremendous breakthrough for the women in this traditionally "macho" culture. Had the water supplies provided no other services to the village, it would seem that they were justified solely for the impact they had on women.

F. Impact on Health

While it was not possible to measure the health effects of the project there is a wealth of anecdotal evidence on the health impact in the villages visited. For example, a school teacher in Mallas reported that her second son who was born after the water system was installed and had not been sick with diarrhea as had her first son. In Quercos we were told that four children had recently died before the water supply was installed, and that none had died since. Also 16% of the women interviewed said that the water supplies had improved the health of their families. School teachers in every village visited reported that the water project made one of the biggest impacts on children. They observed that the children came to school cleaner and noted less skin diseases.

G. Impact on Sanitation

Few families in the communities visited had latrines or other excreta disposal facility. Eight households in Toma were connected to the sewer system and one household in Hualalay had a flush toilet. All of the other villagers relieved themselves in the nearby fields.

The potential impact of installing the sewer system in Toma was limited primarily by the small number of households served. The lack of participation by most of the households in Toma is indicative of the lower priority given to excreta disposal as compared to water supplies. In addition to the lack of perceived need for sewer systems, three conditions tend to make it an unattractive investment of the villagers' limited resources. First the physical size and rural setting of the villages make defecation in the fields an attractive cost-free alternative; secondly, in contrast to water systems, the larger diameter pipe and the need to maintain a uniform slope required more labor; and finally the cost of sewer pipe and the sanitary fixtures necessary to take advantage of the system are beyond the purchasing power of many of the families. All of these reasons tend to keep villagers from changing their excreta disposal habits.

About 40% of the women reported that having piped water in the house had improved overall household sanitation, that they had more water for food processing, washing kitchen utensils and housecleaning. In the absence of baseline data on these specific behaviors the team cannot assess the magnitude of these reported changes. There was evidence, however, that there is a clear relationship between the reliability of the water system and the level of personal and household sanitation. This

relationship is presented in Table 1.

Table 1
Observed Levels Of Sanitation And Hygiene Categorized
By Reliability* Of Water Systems

Reliability of System	Levels of Sanitation			No. of Households in each Category
	Clean Houses(%)	Clean Mothers(%)	Clean Children(%)	
Most	81	94	92	16
Average	75	85	58	20
Least	64	79	57	14

*Reliability was defined in terms of reliability of source, adequacy of system design, workmanship, service and maintenance history. See Appendix J for ratings of water systems.

H. Impact on Community Participation

These highland villages have a long history of community participation. The fact that the project produced infrastructures which provide a continuing tangible benefit appeared to reinforce the interest of villagers in other community projects. While some spoke of the need for a church or market place, others saw the need for electricity or other services.

In all of the villages visited, villagers proudly showed the results of their various community efforts. In Mareniyoc, the people had participated in building a chapel, had leveled a hillside for a school playground and enclosed it with a stone wall, built a school, a school kitchen and oven, and a school garden. With the water system completed, they were now talking about building a road to the village. In Quercos, villagers mentioned the need to build a market place and in Toma the townspeople were building a three-room addition to their new school. Last season in Hualalay, the communal school orchard produced 100 boxes of apples which were trucked into Lima and sold for a good profit. The community has now obtained the services of an agricultural engineer to help them to expand and improve the orchard.

The unplanned introduction of food for work from supplemental food programs operating in the region had a negative effect on community participation. Supplemental food was provided at six of the seven villages visited. Rather than helping the project, the introduction of food resulted in a number of complaints. At each of these sites villagers complained about the small quantities of food they received and, in some cases, about inequities in distribution. Authorities in one village reported that people refused to continue working unless they were given

food. These observations were also voiced by CARE officials.

As a whole, the project seemed to reinforce the tradition of community participation. Almost all villagers that took part in the water project had participated or were participating in other community projects and were proud of their achievements.

I. Impact On The Environment

For most households visited the project caused little or no environmental impact. On the other hand, in somewhat less than half of the households small ponds of waste-water and mudholes were created by undrained water. The muddy patios we saw illustrated the problem described by a CARE engineer who said that undrained public hydrants are a public nuisance and a health hazard, but that the installation of house connections without proper drainage exacerbates the problem by proliferating it and bringing it to the household.

Toma was the only village visited which had a sewer system installed under this project. As noted only eight of the 48 families living there had connected to the system which resulted in a very small flow of sewage. This flow discharges from an outfall located across the highway and some 500 meters from the nearest home. The outfall is surrounded by farmland and is not a public nuisance now. Because the volume of sewage is small it is highly diluted in the rainy season flow of the Santa River. However, as Toma continues to grow and as more houses are connected, the larger volume of sewage flow will pose an increasing health hazard to downstream users of the river, especially during the dry season when dilution will be limited by low river flows.

IV. CROSS-CUTTING ISSUES

A. Equity

In two of the villages visited (Mareniyoc and Toma), all of the households were connected to the water system. In Quercos, some of the villagers decided not to participate in the project because they were getting plenty of water from a nearby spring. They were the fortunate ones who did not have to climb down to the Mosna River to get their water. The rest of the families (73% of the village) participated in the project and received household connections.

In Mallas only 50% of the households were connected to the system. One of the village officials explained that the other houses were either too scattered or too far from the main part of the village to make the connections economically feasible. The plans in the project folder did not show the lower houses on the distribution plan. Although these houses were some 300 meters from the village center, it would have been technically

possible to have included them in the project.

In Hualalay one of the village authorities who lived several blocks from the main part of the village received a house connection. Apparently the construction committee decided to utilize all of the alloted one-half inch diameter service pipe to run a special line to his house. All of the participating village families then had to purchase additional service pipe to connect their own homes to the distribution system. One lady whose family had participated in the construction complained bitterly at a meeting the evaluation team held with the Water Committee about not having received a house connection.

B. Appropriate Technology

The designs for the water supply systems installed in this project were borrowed from the National Rural Potable Water Plan. These designs have been used in hundreds of systems installed throughout Peru during the past 16 years. Over this period of time, these specific designs for gravity systems have proven to be the most trouble-free and lowest-cost of all types built in Peru. The only problem is that these systems cannot be used where the source of water is not substantially higher than the village served.

In contrast to the piped water systems, the sewer systems were not appropriate for most rural highland villages. Concrete pipe was expensive and difficult to transport over the dirt roads. Vast amounts of labor were required to install the systems and excessive cash investments needed for sanitary fixtures to utilize them. Furthermore, without adequate treatment, the systems succeeded only in concentrating and transferring the sanitation problem to another location. Viewed within the development context of the typical highland village where even latrines are unknown, a modern sewer system represents a quantum jump that most villagers are not prepared to make at this time.

C. Sustainability

Spring-fed gravity water supplies are the simplest and cheapest type of system to operate and maintain. The designs used in this project avoided the use of any pump or motors and used only low-technology mechanical accessories such as gate-valves, pressure-reducing float valves, and the household faucet. The concrete structures (spring-boxes or canal diversions, pressure reducing chambers and storage tanks) were well designed and constructed. Wherever irrigation canals were used as the source of water, the system design included sedimentation tanks and slow sand filters which required only rudimentary knowledge to operate. These treatment units are gravity fed and gravity operated.

Rigid polyvinyl-chloride (PVC) pipe with glued joints was used for all of the pipelines. Although PVC pipe can be damaged more easily than galvanized iron pipe, it is also cheaper, easier to transport and install, rust-proof and simpler to repair.

Inspection of five completed systems by the evaluation team revealed that there had been pipe failures in the transmission and distribution lines in at least two systems. However, in each case the breaks had been repaired by local workmen. The only damage reported that had not been repaired was a leak in the spring-box at Quercos. However at the time of the evaluation team visit, no leaking from the spring-box was observed. This probably was due to low flow conditions at the time. Otherwise, four of the five systems had been maintained at a sufficient level to provide a continuous supply of clean water in sufficient quantities to satisfy all of the basic household needs. Low spring flows at Quercos during the 1980 dry season forced many families to revert to their traditional river source.

The five systems have been sustained financially during their first year of operation by the Administrative Juntas without outside assistance. Only minor purchases of pipe, glue and faucets have been necessary in four systems. In the fifth system, Quercos, no maintenance items have been bought. In Mallas repairs were made with spare materials left over from the construction. In the other three villages, monthly fees of S/30 or S/50 (U.S. $0.09 to $0.15) per household were being collected and this income was being used for the purchases.

Both the project agreement and MOH regulations place the burden of operating and maintaining the water supply system directly on the villagers. Based on the brief operating history of the five completed systems visited, the evaluation team concludes that the gravity water supply systems installed by this project are sustainable within the context of the technical and financial resources available at the village level but technical supervision is needed in the long term.

D. Replicability

The water supply systems built under this project replicate the two simplest and lowest-cost designs which have been built throughout Peru since 1964. These designs have been tested and proven over the past 16 years with local villagers managing their day-to-day operation and maintenance. The capital cost for the 20 water supplies built for which cost data are available was $20.25 per capita. While this seems to be a reasonable capital investment for installing water supplies, the history of all major investments in the rural water sector which have been heavily subsidized by external donors indicates that Peru will not continue building many rural water supplies without outside assistance.

In contrast to the water supply component, the installation of sewers does not appear to be a reasonable investment option. The average capital investment cost of the three completed sewer systems was $35.17 per capita and labor requirements were reported to run from three to five times that for water supplies. The capital investment costs of the system in Huantar was $108.93 per capita.

Water supply systems took an average of five and one-half months to build and sewer systems took 15 months. Considering the problems encountered in this project in obtaining volunteer labor, it would be unrealistic to plan future sewerage projects based on the self-help concept. Without volunteer labor, the capital costs for sewerage projects would rise dramatically. These high capital costs combined with the massive labor requirements would eliminate any possibility of replicating this project component.

V. LESSONS LEARNED AND RECOMMENDATIONS (* Specific Recommendations to the Government of Peru can be found in Appendix L)

Coordination Among Implementing Agencies

In the post-1970 earthquake years, ORDEZA had built a reputation as a new, powerful agency that got things done. CARE believed that ORDEZA had the "muscle" to demand and get cooperation from old-line agencies, i.e., Ministry of Health, to provide services which were an integral part of the project design.

As it turned out, the MOH frustrated ORDEZA's efforts to provide health services in a timely way. Because of the lack of coordination that resulted from the shifting of operational programs from old-line Ministries to ORDEZA, CARE's expectations for good interagency collaboration were neither realistic nor achievable.

Recommendation: In projects that involve more than one implementing agency, A.I.D. planners should take into account interagency conflicts which could impede project execution.

Funding of Simple Water Supply Projects

What began as an integrated project combining water, sewerage, health education, and vaccination components ended, essentially, as a relatively successful water supply project. In spite of the failure of the other three components to achieve their purposes, the installation of piped water supplies by themselves, produced a significant positive impact on the lives of those villagers with household connections. At a minimum they provided a highly valued service and established a tangible basis for improving their "sanitation and health well-being."

Recommendation: Where the installation of piped water supplies is the top priority of a target population, AID should be willing to authorize a project whose purpose is solely to improve the accessibility, quantity, and quality of water with the understanding that this will assist in improving health.

The Role of the PVO's

While this project could have been implemented by ORDEZA alone it would not have accomplished nearly as much without CARE's participation. As a PVO, CARE was spared the severe budgetary and administrative problems experienced by GOP agencies during the period of project implementation, and was able to give the project full attention. CARE hired competent Peruvian professional and technical staff to manage the project. When the project ran into implementation problems and delays, the CARE staff was able to get the attention of officials and the needed resources to keep the project moving ahead. As a result, many systems were built in record time.

Recommendation: A.I.D. should selectively utilize PVOs to implement technical projects where they have relevant professional and technical staffs who can manage them competently.

Evaluation of Water Supply Projects

Even had the plan to measure the project's impact on the health of the beneficiaries been well-executed, it would not have accomplished the task set forth. To begin with, the planners underestimated the complexities involved in designing and implementing a simple but credible evaluation. Other well-planned and well-financed studies costing millions of dollars have failed to produce significant findings. There is no reason to expect that this project will produce any data that unquestionably link improvements in the health of beneficiaries to the installation of piped water supplies.

Recommendation: When the main purpose of a project is to provide drinking water, A.I.D. should not sponsor perfunctory evaluations which attempt to attribute health impacts to the installation or improvement of water supplies.

Imported Construction Materials

PVC pipe manufactured in the U.S., was imported specifically for this project. Although Mission engineers recommended and requested a waiver for the purchase of locally manufactured pipe, U.S. pipe was purchased because of considerable savings in cost.

Village officials reported difficulties in finding replacement pipe on the local market. They also reported that they had to heat and force-fit locally available pipe to match the project pipe. This procedure is not acceptable for permanent repairs.

To avoid delays in project implementation, imported pipe had to be procured as early as possible. Since project sites had not been chosen pipe quantities had to be estimated without a solid basis. As construction progressed it was soon realized that too much pipe had been purchased. This oversupply of imported pipe forced a change in project design. Rather than store the extra pipe, CARE decided to increase the number of water supplies to be built. Had it been decided to purchase locally manufactured pipe, CARE would not have had to buy all of the pipe at the beginning and, as it became clear that less pipe was needed, it could have used some of the funds to bolster other weaker elements of the project thereby producing outputs more in balance with the original intent and design.

Recommendation: To enhance the sustainability of projects, AID should encourage the use of locally produced construction materials. Planners should be aware of the fact that imported materials tend to become the limiting element in development projects and produce rigidities in their design and implementation.

Food for Work

None of the project documents mentioned "food for work" as a project element. However, in five of six projects visited, food was distributed to villagers who worked. At each site where food was distributed, villagers complained about the small quantity of food given to them. In one village the officials reported that people refused to continue working unless they received food.

In a region where voluntary participation in community projects is a centuries-old tradition, the interjection of "food for work" was neither needed nor desirable. It created more problems than it solved.

Recommendation: In areas where voluntary participation in community projects is traditional, AID-supported projects should not include "food for work" as a project component unless voluntary work would deprive people of needed food. It would be better to use food in truly needy or emergency situations or develop separate programs (e.g., maternal and child health) where a specific population group needing food supplements can be targeted for maximum impact.

APPENDIX A
METHODOLOGY

The Care Rural Water Health Services Project was selected for evaluation to provide further information on water supply projects implemented by a private voluntary organization and also to derive lessons which may be of value in implementing the USAID/Peru sponsored Rural Water Systems and Sanitation for the Sierras Project which was authorized in 1980.

The evaluation team was composed of two AID/Washington staff and one Peruvian social scientist. The team was assisted by a Quechua language interpreter who is a resident of Ancash Department, the project target area, and the CARE nutritionist who also speaks Quechua and who was born and raised in the project region. All team members were women except for the team leader and the driver.

Research Design

Four basic issues were identified for the evaluation of this project:

(1) Were the intended outputs in place? More specifically, were systems installed and operating and were services rendered as planned?

(2) Were the target populations utilizing the new knowledge, systems, and services as planned?

(3) What impacts did the project have on health, health practices related to water use, sanitation practices, community structure, household and community finance, women and children and on the environment?

(4) What kinds of lessons can be derived from this project?

A multifacet data collection strategy was developed by the AID members of the team to obtain the necessary information to answer the basic research questions listed above. The project history was reconstructed through document review and interviews held with AID and CARE officials who had participated in the project design and/or implementation and with persons knowledgeable about Peruvian rural water history and about the sociocultural background of Ancash Department (see Appendix B).

Data from the communities was collected through semi-structured interviews with village leaders (mostly men) and with village women.

Village leaders were asked specific questions regarding the history of construction, community participation, operation and maintenance and perceived effects. The questions addressed to women dealt with their perception of operation of the system, usage, personal and household hygiene, sanitation practices and perceived consequences of the project on them and on their family lives.

Since it would have been impossible to visit all twenty-nine projects which had been completed at the time of this evaluation, the evaluation team decided to conduct an intensive study of a few systems and spend at least one day at each site. The main criteria used in the selection of sites were: (1) geographical representation of the three administrative areas (Huaylas, Alto Maranon and Chimbote) in which the project was implemented, (2) degree of accessibility to regional centers and (3) representation of the different types of project intervention. The table below lists the sites visited.

Degree of Accessibility

Administrative Region	More Accessible	Less Accessible
Huaylas	Toma (Water, sewer, health education)	Mareniyoc (Water, health)
	Huaripampa (under construction)	
Chimbote		Hualalay* (Water)
Alto Maranon	Quercos (Water, health education)	Mallas (Water)

* The team stayed at this site overnight.

At each site the team interviewed village leaders, inspected system installations and interviewed village women representing about 5 percent of the families in each community. The total number of women interviewed was 50.

Mode of Operation

Upon receipt of Mission concurrence for the evaluation, the AID/W team members began to collect and review project related documents. In view of

the short lead time to prepare for departure and the large volume of documents identified, the team contracted the expert services of Dr. Charlotte Miller, a social anthropologist who had lived and worked in Peru from 1977 to 1979, to review background documents, to conduct telephone interviews with knowledgeable persons outside the Washington area, and to prepare a brief socio-economic analysis of the project region.

Meanwhile, the AID/W team members continued to prepare themselves by reviewing evaluation methodologies and sample questionnaires. They also developed a logical framework from project documents (See Appendix K) and the issues to be addressed, regarding project design, implementation and impacts. A number of knowledgeable persons in Washington, D.C. were interviewed. Mr. Harold Northrup of CARE/New York, who had been CARE Director in Peru during the conception and the signing of the Operational Program Grant (OPG), travelled to AID/W to meet with the team. Before departure the team had prepared lists of questions for project officials, village leaders and preliminary questionnaire for village women.

The team arrived in Lima on November 26th and spent three days finalizing logistical support for the field work and interviewing officials knowledgeable about the project. Meetings were held with AID, Ministry of Health, Pan American Health Organization and CARE officials.

The team departed for the field on November 30th and set up its field study base in Huaraz, capital of Ancash Department. During the weekend the team redrafted, pre-tested and revised its household questionnaire in the nearby town of Tarica, one site of the water project. The team then received briefings from CARE, ORDENOR-CENTRO and regional MOH officials.

After making its official contacts the team began its round of visits to pre-selected project sites to carry out interviews and apply its questionnaires. The team met each evening to review the day's experience and to prepare for the next day's work.

Upon completion of the field study (December 15th) the team returned to Lima and prepared a draft report. The team then debriefed Mission and CARE staffs before departing the country.

APPENDIX B
LIST OF PERSONS CONTACTED

AID/Washington:

Abby Bloom, PPC/PDPR
Dan Dworkin, PPC/E/S
Gene McJunkin, DS/H
Bill Rhodes, Peru desk
Barbara Sandoval, LA/DR
Larry Smucker, PPC/PB

AID/Peru:

Edilberto Alarcon
Helene Kaufman
Bob Kramer
Enrique Schroth
Leonard Yeager, Mission Director

CARE/Peru:

Manuel Alvarado
Jose Calderon
Marco Antonio Campo
Javier Castillo
Carmen Rosa Cordoba
Dale Harrison, Director
Jose Moreno
Barry O'Neal

IDB:

Juan Alfaro
Jose Villatoro

IBRD:

Alfonso Zavala

MOH (Division of Sanitary Engineering):

Carlos Marroquin, Director

PAHO/Washington:

David Donaldson

PAHO/Peru:

Carlos Cuneo
Jose Antonio Godoy
Edmundo Ossio

ORDEZA/Peru:

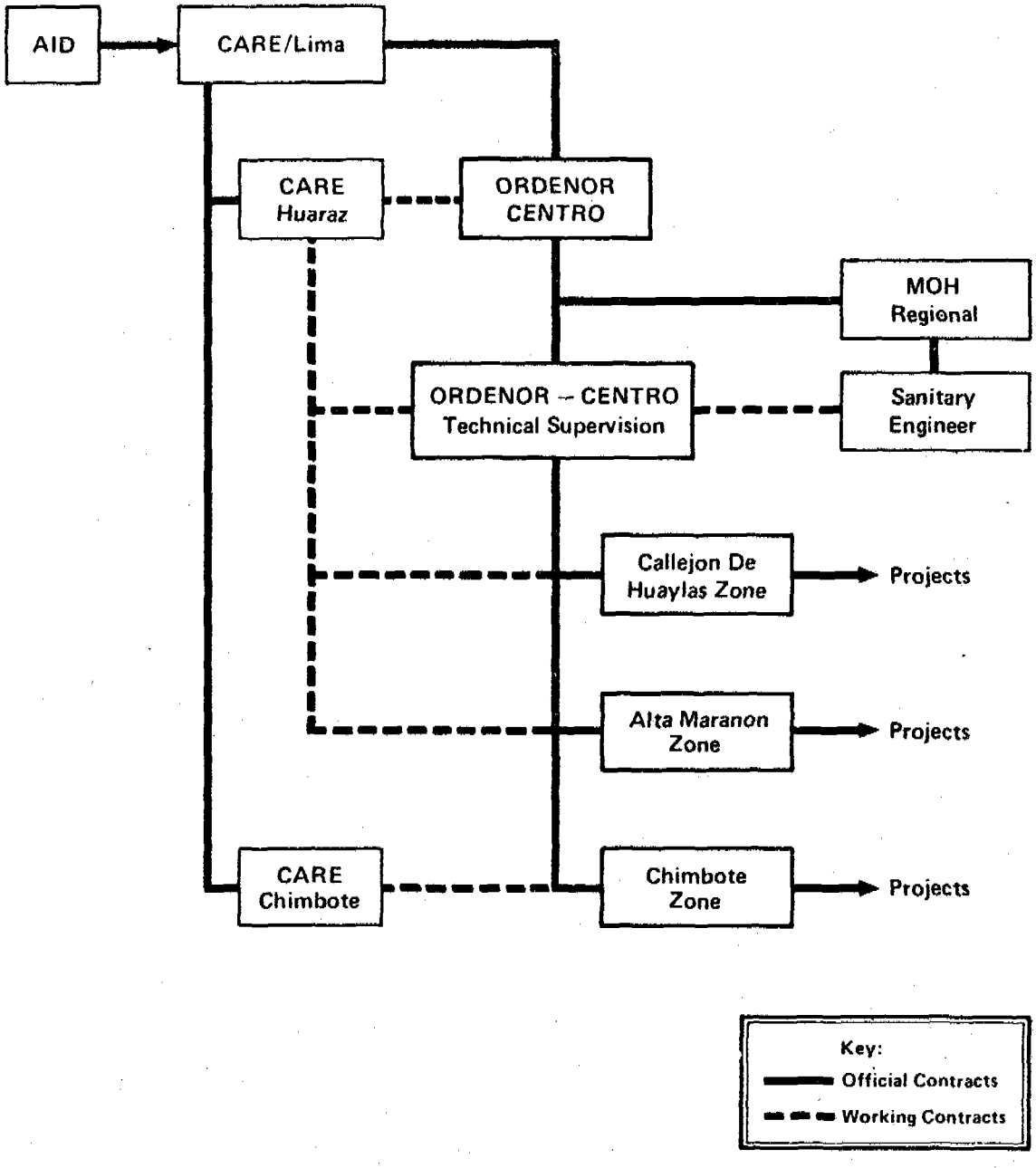
Jorge Galdos, Regional Sanitary Engineer
Guillermo Maguina, Technical Supervisor
Orlando del Pino, Project Engineer
Leoncio Suzuki, Regional Health Director

APPENDIX C
PROJECT BUDGET

LINE ITEM	A.I.D. $	CARE $	ORDEZA* Sol	VILLAGERS
Pipe & Accessories	223,000		1,700,000	
Cement, Wire and Wood	18,000		300,000	
Equipment, Transportation, and Implementation	109,000		4,500,000	
Vehicles		9,480		
Office Equipment, and Supplies		6,600		
Personnel/Operations		172,920		
Volunteer Labor				undetermined
Local Materials				undetermined
Cash				undetermined
Sub Totals	450,000	189,000	6,500,000	undetermined

*ORDEZA contributed an additional S/ 12,000,000 on 10/2/79

APPENDIX D
ORGANIGRAM



APPENDIX E
DIFFERENCES IN AGREEMENT OBJECTIVES

DATE	DOCUMENT	WATER SUPPLIES	SEWER	HEALTH EDUCATION FOCUS	VACCINATION	EVALUATION
8/77	A.I.D. Grant Agreement	20	4	Sanitation, Nutrition, Personal Hygiene, etc.	Smallpox, tuberculosis, measles, polio, DPT, etc.	Preliminary random health surveys for baseline data on morbidity and mortality and causes. 2nd survey in 3rd year.
10/77	CARE/ORDEZA	20	4	Food handling and preparation. Bimonthly visits to villages by 2 health educators.	Vaccinations deemed necessary by MOH such as DPT. Visits to villages twice a year.	(No evaluation component.)
10/78	MOH/CARE/ORDEZA	N/A	N/A	Local health promotors to be trained under AID-supported Primary Health Care Project.	Local health promotors to be trained under AID-supported Primary Health Care Project.	Malnutrition study. Evaluation at end of project.
10/79	CARE/ORDEZA Extension*	55 (additional)	3	(No change)	(No change)	(No change)
11/80	Actual Accomplishments	29 (completed) 24 (under construction)	5 2	Health talks given and movies shown in 12 villages during team visit in May 1979 and 13 villages in September 1980.	None provided by project.	Questionnaires completed in 10 villages by team in Nov./Dec. 1978. Questionnaires completed in 13 villages by team in September 1980.

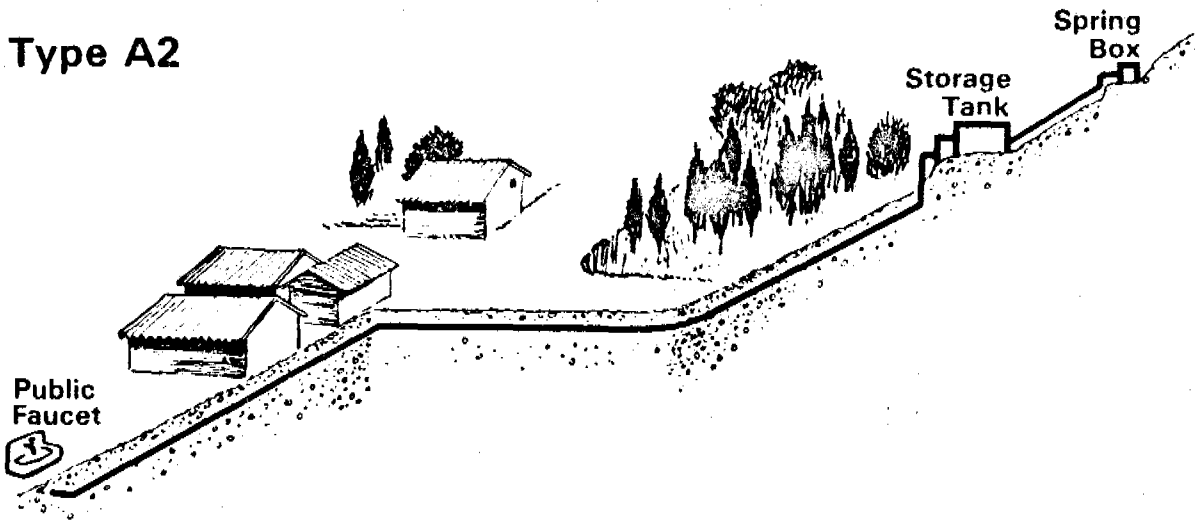
*ORDEZA contributed additional S/. 12,000,000. Project extended until October 1981.

Add CARE Project Proposal (7/76)

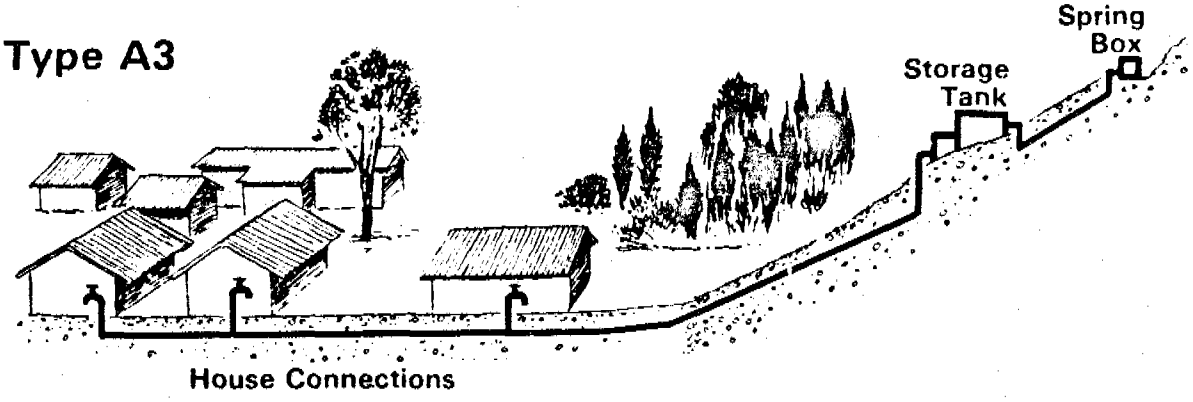
APPENDIX F

Types of Water Systems

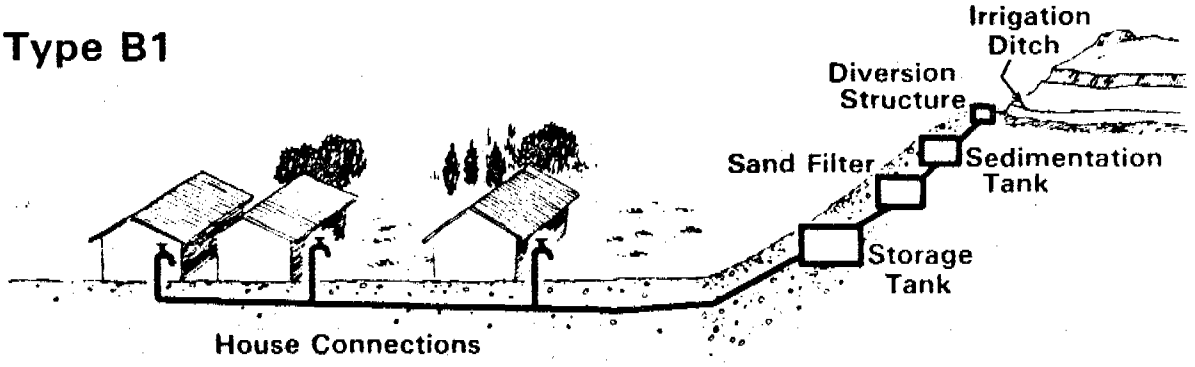
Type A2



Type A3



Type B1



Government of Peru
Ministry of Health

APPENDIX G
CHRONOLOGY OF PROJECT EVENTS

7/76	CARE submits project proposal to AID.
8/77	AID/CARE grant agreement signed.
10/77	CARE/ORDEZA project agreement signed.
10/78	MOH/CARE/ORDEZA acta de acuerdos signed.
11/78	First multidisciplinary team visits villages.
4/79	Project evaluation study made.
4/79	AID authorizes project expansion and extension.
5/79	Second multidisciplinary team visits villages.
10/79	CARE/ORDEZA project amendment signed.
9/80	Third multidisciplinary team visits villages.
11/80	Impact evaluation study started.

APPENDIX H
MULTIDISCIPLINARY TEAM FIELD VISITS

VILLAGE	VISIT NUMBER / ACTIVITIES PERFORMED		
	I 11/15 to 12/11/78	II 5/6 to 22/79	III 9/15 to 10/11/79
CARHUAYOC (control)	Q, P, N	N, HE	Q, P, N, HE
HUALLCOR	Q, P, N	P, N, HE	Q, P, N, HE, WS
HUANTAR	Q, P, N	P, N, HE	Q, P, N, HE
HUARIPAMPA	Q, P, N	P, N, HE	Q, P, N, HE, WS
QUERCOS	Q, P, N	P, N, HE	Q, P, N, HE, WC
SHANCAYAN	Q, P, N	P, N, HE	Q, P, N, HE, WS
SANTA CLARA	Q, P, N	--------	Q, P, N, HE
TOCASH (control)	Q, P, N	N, HE	Q, P, N, HE, WS
TOMA	Q, P, N	P, N, HE	Q, P, N, HE, WS
UTUPAMPA	Q, P, N	P, N, HE	Q, P, N, HE, WS, WC
CAYAC	-------	P, N, HE	Q, P, N, HE
MARENIYOC-MATAQUITA	-------	P, N, HE	Q, P, N, HE
LLUMPA	-------	P, N, HE	Q, P, N, HE

Key: Q - Questionnaire applied

P - Parasite study

N - Nutrition study

HE - Health Education Activity

WS - Water Samples taken and analyzed

WC - Water Committees formed

APPENDIX I

DATA FOR COMPLETED WATER SYSTEMS **

	BEGIN CONSTRUCTION	COMPLETION DATE	PROJECT TYPE	WATER SOURCE	NUMBER OF CONNECTIONS	NUMBER OF FAMILIES	TOTAL COST (U.S. $)	COMMUNITY CONTRIBUTION (U.S. $)	PER/CAP COST (U.S. $)
CAYAC	7/78	12/78	EXPANSION	SPRING	82	260	12,157	5,225	9.35
PURHVAY	10/78	11/78	NEW	SPRING	2(public)	24	890	476	7.32
* TOMA	7/78	11/78	NEW	SPRING	48	48	20,359	13,777	42.41
* HUALALAY	6/78	1/79	NEW	SPRING	56	72	6,727	1,500	93.43
* MARENIYOC-MATAQUITA	11/78	1/79	NEW	SPRING	129	140	12,806	6,311	17.54
SHANCAYAN	7/78	1/79	EXPANSION	SPRING	34	95	7,469	3,030	16.59
UTUPAMPA	9/78	2/79	NEW	SPRING	66(public) 1(public)	82	10,027	4,983	23.87
LOS OLIVOS	9/78	2/79	NEW	SPRING	82	92	9,743	4,741	20.95
* QUERCOS	9/78	3/79	NEW	SPRING	66	90	9,650	2,916	20.10
HUARIPAMPA	6/78	3/79	NEW	SPRING	105	110	17,966	9,779	22.33
LLUMPA	8/78	3/79	NEW	SPRING	32	40	6,169	1,527	12.85
HUANTAR	12/78	3/79	EXPANSION	SPRING	70	70	5,213	918	13.72
COMBAMIRAZ	10/78	5/79	NEW	SURFACE	21	21	4,816	600	34.4
PILLIPAMPA	10/78	5/79	NEW	SURFACE	67	67	13,421	3,300	35.32
RAYPA	12/78	6/79	NEW	SURFACE	42	50	9,435	1,500	33.7
SANTA CRUZ	10/78	10/79	NEW	SPRING	41	58	5,878	1,370	18.98
SANTA CLARA	8/78	10/79	NEW	SPRING	134	142	13,599	4,912	15.96
CATAYOC	7/79	10/79	NEW	SPRING	52	56	4,574	1,639	15.14
* MALLAS	8/78	10/79	NEW	SPRING	61	120	7,401	1,561	9.48
PALTAY	9/79	10/79	NEW	SPRING	72	72	6,631	2,539	16.77
PUEBLO VIEJO	11/79	12/79	NEW	SPRING	4(public)	24	2,311	682	19.25
PAN-PAM	10/79	1/80	NEW	SPRING	70	76	3,927	922	10.33
TARICA	9/79	2/80	EXPANSION	SPRING	178	245	11,507	4,305	9.39
ALEJADERO	9/79	2/80	NEW	SPRING	48	48	5,814	974	22.36
PAMPAS	6/79	9/80	NEW	SPRING	250	250	12,311	N.A.	9.84
LUPAHUARI	9/79	9/80	NEW	SURFACE	43	43	10,244	N.A.	47.65
ANCOS	9/80	10/80	EXPANSION	SPRING	50	50	8,340	N.A.	33.36
EL PORVENIR	9/80	10/80	NEW	SPRING	42	42	4,232	N.A.	20.15
MIRAFLORES	10/79	10/80	NEW	SPRING	130	130	11,355	N.A.	17.47

* Sites visited by impact evaluation team.

** Source: This table was prepared from CARE Status Completion Reports.

APPENDIX J
COMPARATIVE RATINGS OF WATER SYSTEMS

ITEM RATED	MALLAS	QUERCOS	MARENIYOC	HUALALAY	TOMA
Reliability of Source	Good	Questionable	(Not visited)	Good	Good
System Design	Good	Fair	Good	Good	Good
Workmanship	Fair	Fair	Good	Fair	Excellent
Households connected	50%	73%	100%	78%	100%
Service History	Good	Bad	Excellent	Good	Excellent
Maintenance History	Good	Bad	Excellent	Fair	Excellent
Admin. Committee	Good	Poor	Excellent	Good	Good
Fee Payment	FEE SET, NOT COLLECTED	FEE SET, NOT COLLECTED	Yes	Yes	Yes

AID 1020-28 (1-72)

APPENDIX K
LOGFRAME

Project Title & Number: Rural Water/Health Services Project (527-0177)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes:	Measures of Goal Achievement:		Assumptions for achieving goal targets:
None Described In Documents	N/A	N/A	N/A
Project Purpose:	Conditions that will indicate purpose has been achieved: End of project status.		Assumptions for achieving purpose:
Improve overall sanitation and health well-being of rural villagers.	1 & 2. Reduction in water and sanitation related diseases. 1 . Continual supply of piped water in households. 3. Villagers immunized. 4. Health and sanitation knowledge and practices improved.	1 & 2. Evaluation of health status 1 & 2. Field Inspection and Interviews. 3. Health records and field interviews. 4. Field interviews.	1. Improved water supplies will improve health. 2. Sewer systems will improve sanitation. 3. Immunization will protect villagers against specific diseases. 4. Health education will improve health knowledge and practices.
Outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
1. Water supplies built. 2. Sewer systems built. 3. Vaccinations given. 4. Health education provided.	1. Water supplies built and operating. 2. Sewer systems built and operating. 3. Villagers vaccinated. 4. Villagers received health education.	1. Field Inspection. 2. Field Inspection. 3. Project and Health records. 4. Project records and field interviews.	Inputs are adequate to produce outputs. CARE/ORDEZA are capable of implementing project. Project is implemented as planned.

Inputs: *

1. AID:
   a. $450,000 for imported materials
   b. ---
   c. Project Monitoring
   d. ---
2. CARE:
   a. $189,000
   b. Procurement Services, Vehicles
   c. Representative In Huaraz
   d. Huaraz office, Transport materials
3. ORDENOR-CENTRO:
   a. S/ 6,500,000
   b. Engineering equipment, Vehicles
   c. 2 engrs, 2 topog, 1 draftsman, masons for each sub project
   d. Huaraz Warehousing, Rights of Way, Legal responsibility for project.
4. MOH:
   a. None
   b. (Unspecified)
   c. 2 Health Educators, 1 Vaccination Team
   d. Health education and Vaccination Campaigns
5. COMMUNITIES:
   a. Cash (amount not set)
   b. Local materials (unspecified)
   c. Volunteer Labor, Water Committee
   d. Local Warehousing, Land, Rights of Way.

* a. Money
b. Material/Equipment
c. Personnel
d. Facilities, Services

APPENDIX L
SPECIFIC RECOMMENDATIONS

Although the following recommendations may be applicable in other countries, they are addressed specifically to the A.I.D. Mission in Peru because of their particular relevance to the conditions that exist there.

1. Gravity Systems

Because of the superior performance history of gravity water supply systems in the National Rural Potable Water Plan, A.I.D. should continue to sponsor gravity systems wherever this option exists. Since gravity systems are not always possible, A.I.D. should also assist the GOP in developing adequate designs, manpower and institutions to install, operate and maintain pumped water supply systems.

2. Pipeline Design and Installation

Improved detailed designs should be developed and provided in the project construction portfolio giving special attention to maintaining minimum pipeline cover depths especially at breaks in slope (e.g., at terraces and road crossings). Elbows (codos) should be specified for sharp bends. Backfill material should also be selected to avoid contact between sharp rocks and other hard materials and the PVC pipe.

3. Riser Pipe

The PVC household faucet riser pipe should be reinforced and protected to preclude damage and breakage. The riser pipe can be installed within a larger diameter (e.g., 3") PVC pipe anchored into the ground and filled with earth for stability. The riser pipe can also be installed in an adobe wall or column for support and protection. Another alternative would be to use galvanized iron pipe for the riser. In any case, the riser pipe must be given adequate support and protection to resist strains from opening and closing the faucet or by suspending containers from it.

4. Operation and Maintenance

The project did not describe or fund an activity to provide information or training to the villagers in the operation and maintenance of the completed systems. Although the water supply systems visited were providing sufficient water to meet basic household needs, the level of service could be improved substantially with a minimum input of information and training. As these systems age over the years, the maintenance requirements will increase. Unless villagers are given proper assistance and training in operation and maintenance skills, these water supply systems may become inoperative. Future water supply projects should include a training component to train members of the administrative juntas in the operation and maintenance of the water system and to provide standard billing, collection and accounting forms for record keeping.

5. Dual - Village Systems

Because of the severe problems caused by inter-village rivalry and strife in both construction and operation phases of water supplies serving two villages from a single source, it is recommended that wherever it is technically feasible, even if the construction of separate systems raises capital cost (within reason), dual-village systems should not be built.

6. Drainage

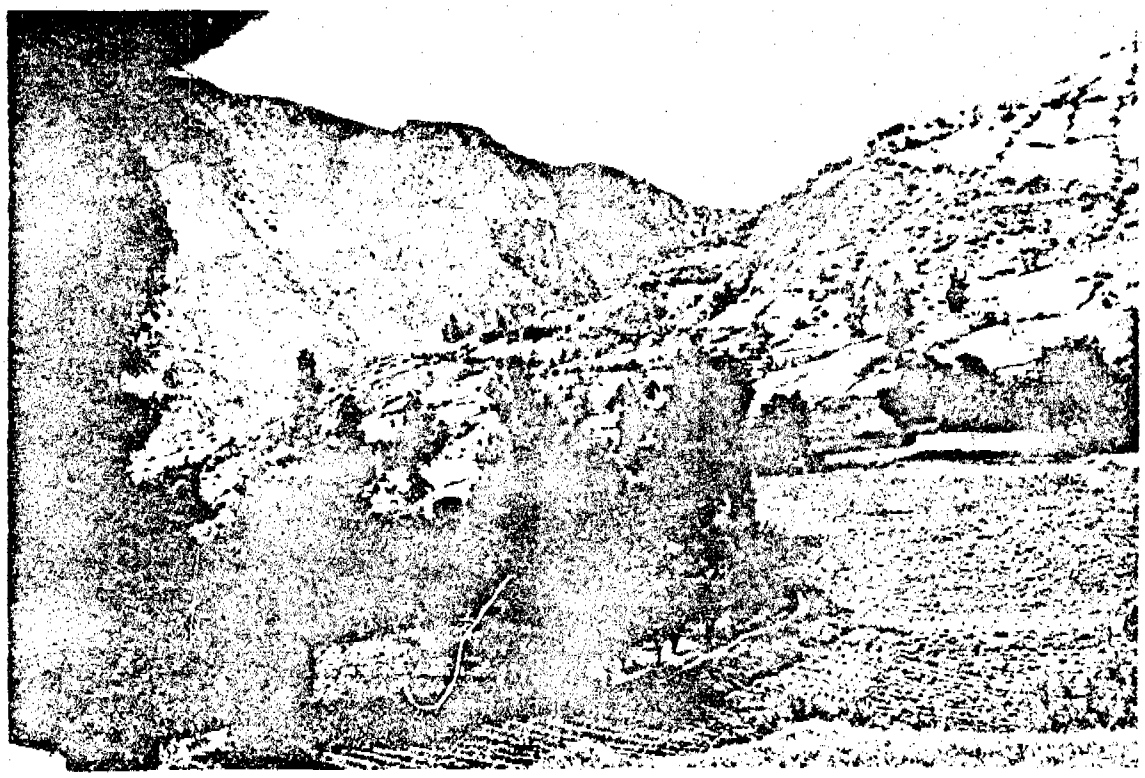
Water faucets not properly drained can become foci of disease transmission. The project did not provide for the construction of drains. Consequently, in many households, what previously had been a rainy-season nuisance was now converted into a continuous year-round problem. Any health gains made from the installation of piped water supplies could easily be wiped out by the ubiquitous new mud-hole. Water supply projects should include designs for adequate and appropriate drainage facilities.

7. The Village Schoolteacher

In Ancash Department, schoolteachers are by far the most effective development agents in rural villages. Being from the urban scene, they bring with them many modern concepts and practices. They are aware of the relationship between cleanliness and health. Their position commands respect from the villagers and they are in daily contact with the most promising segment of rural society -- the school children. If the team observed any perceptible changes in health practices, it was seen in the washed faces and combed hair of the school children. With piped water available, schoolteachers are insisting that their students come to school clean. The schoolteacher is a major resource in the rural villages and should be provided an appropriate role in rural development projects.

APPENDIX M
PHOTOGRAPHS

To the women and children of Ancash



Typical landscape of project area.

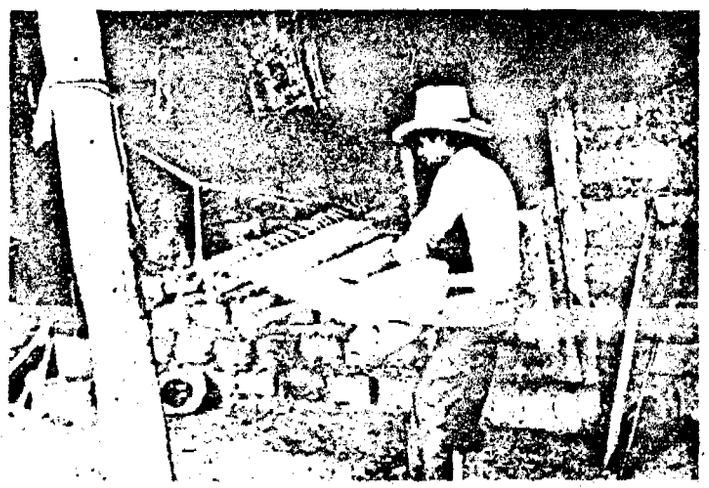
Typical isolated village in project area.

Typical kitchen with guinea pigs

Cooking on the floor

Ancash woman herding livestock to graze

While livestock graze, woman spins yarn



Weaving yarn into clothing

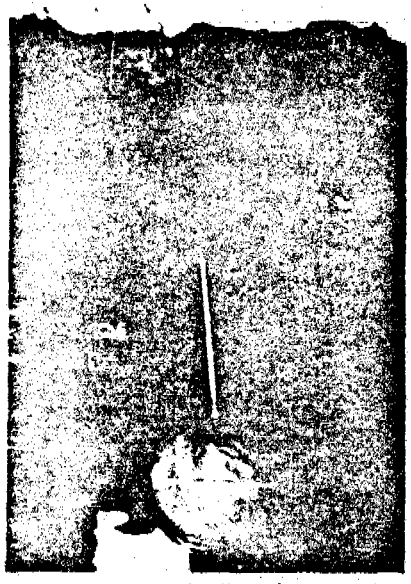
Traditional water source

Woman carrying water

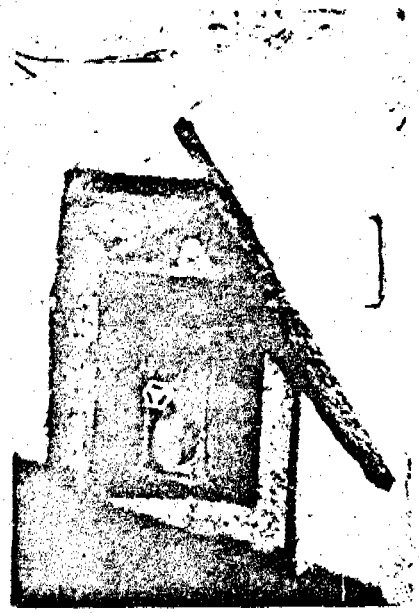
Washing clothes in irrigation canal

Washing grain in stream

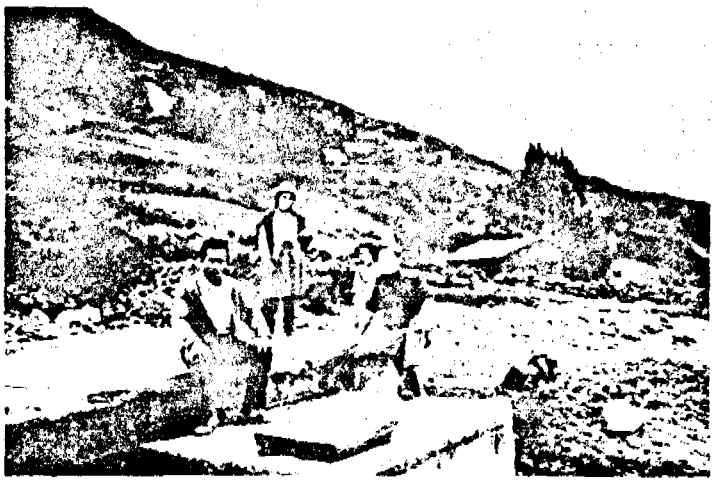
Spring flow into spring box



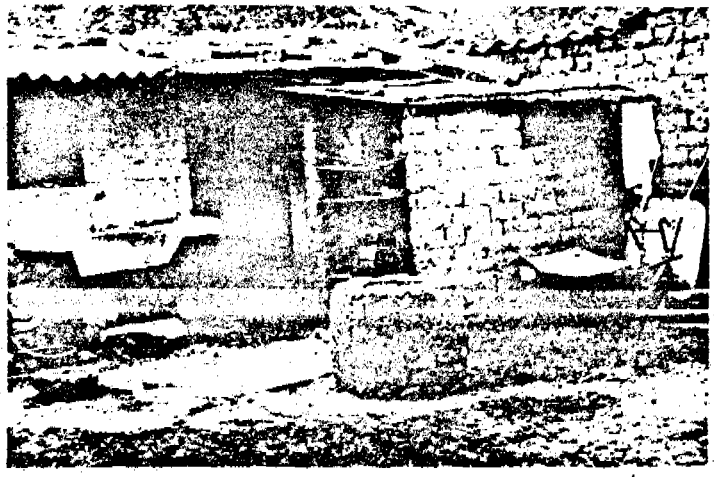
Pressure reducing float valve



Street cut off valve



Storage tank

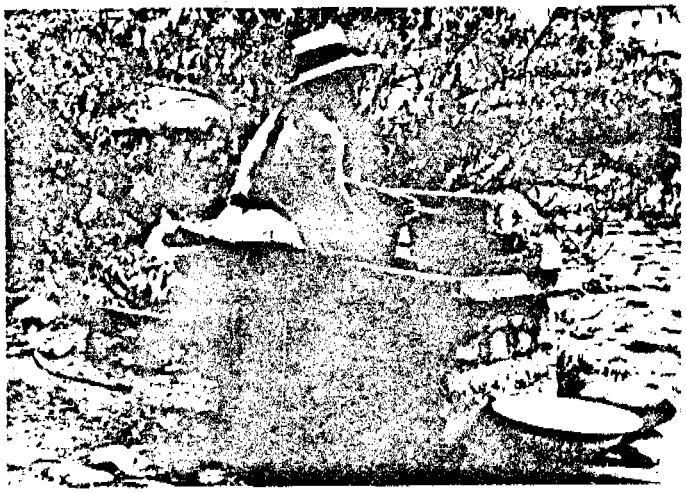


Household faucet in typical patio

Typical patio scene showing inadequate drainage

Household faucet with adequate drainage. NOTE: Drainage pipe under sink

Women reaping project benefits



. 9: Senegal: The Sine Saloum Rural Health Care Project (October 1980) PN-AAJ-008
. 10: Tunisia: CARE Water Projects (October 1980)
. 11: Jamaica Feeder Roads: An Evaluation (November 1980)
. 12: Korean Irrigation (December 1980)
. 13: Rural Roads in Thailand (December 1980) PN-AAH-970
. 14: Central America: Small Farmer Cropping Systems (December 1980) PN-AAH-977
. 15: The Philippines: Rural Electrification (December 1980) PN-AAH-975
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. 17: Honduras Rural Roads: Old Directions and New (January 1981) PN-AAH-971
. 18: Philippines Rural Roads I and II (March 1981) PN-AAH-973
. 19: U.S. Aid to Education in Nepal: A 20-Year Beginning (May 1981) PN-AAJ-168
. 20: Korean Potable Water System Project: Lessons from Experience (May 1981) PN-AAJ-170
. 21: Ecuador: Rural Electrification (June 1981) PN-AAH-979
. 22: The Product is Progress: Rural Electrification in Costa Rica (October 1981) PN-AAJ-175
. 23: Northern Nigeria Teacher Educational Project (Sept. 1981) PN-AAJ-173
. 24: Peru: CARE OPG Water Health Services Project (October 1981) PN-AAJ-176
. 25: Thailand: Rural NonFormal Education - The Mobile Trade Training Schools (October 1981) PN-AAJ-171

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. 2: Water Supply and Diarrhea: Guatemala Revisited (August 1980) PN-AAJ-007
. 3: Rural Water Projects in Tanzania: Technical, Social, and Administrative Issues (November 1980) PN-AAH-974
. 4: The Social Impact of Agribusiness: A Case Study of ALCOSA in Guatemala (July 1981) PN-AAJ-172
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