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ANNEX 5.14

ENVIRONMENTAL SANITATION

GUATEMALA HEALTH SECTOR ASSESSMENT

November 1977

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Annex 5.11

ENVIRONMENTAL SANITATION

I.A. INTRODUCTION AND OVERVIEW

Environmentally-related diseases are the leading cause of death and sickness in Guatemala.¹

Planners and others at the national and international levels who develop programs to improve environmental sanitation are familiar with the data on morbidity and mortality due to diseases caused by the lack of adequate environmental sanitation. However, most of the people who suffer from the diseases are unaware of their causes or of simple techniques to prevent them.

A health education component is essential for all types of environmental sanitation programs and must be provided on a continuing basis. Community involvement and participation from the beginning is important if the project is to be widely accepted and if the villager is to understand how the local labor and material he contributes to that provided by outside agencies will make it possible for him to gain environmental improvements which he could not hope to obtain alone.

In the development of all environmental sanitation programs, emphasis must be placed on (a) sensitizing the MOH staff to the attitudes and practices² of the people whom they are trying to reach,

¹ See Annex 4: Communicable Disease Control.

² See Annex 17: Survey of Environmental Sanitation Attitudes and Practices for a discussion and comparison of the attitudes and practices of Ladinos and Indians with respect to environmental sanitation programs.

(b) carefully identifying appropriate and acceptable points of intervention which will facilitate the introduction of new technology or behavior patterns, and (c) providing community health impact programs desired by the villagers which will benefit the population for whom the program is intended.

The Ministry of Health already has the organization and most of the staff necessary to help the villagers help themselves in improving environmental sanitation conditions. The TSR provides a point of liaison between the MOH and the villager and with improved supervision and guidance could better help the villagers develop the potential to improve their environment.

A number of rural environmental sanitation issues are addressed in this report, but it specifically focuses on (a) expanding rural water supply programs, particularly to areas not readily supplied by gravity flow systems, (b) augmenting the installation of sanitary latrines, including continuing promotion and health education, (c) utilizing the self-help potential in rural communities, and (d) developing and effectively using personnel trained specifically for the functions they are to perform.

I. B. ENVIRONMENTAL SANITATION MANPOWER RESOURCES

The most widely distributed manpower resource in environmental sanitation at the present is the MOH sanitary inspector. Another important resource is the Rural Health Technician (TSR), who, although he outnumbers the sanitary inspectors, is not as widely distributed. Both the sanitary inspectors and the TSRs participate in a variety of environmental sanitation activities. A third manpower resource currently being developed, is the Rural Water Technician (TAR), who will be concerned only with rural water systems. However, it will be at least a year before the training program for the TAR is completed.

These three environmental sanitation manpower resources are described briefly:

1. The Rural Health Technician (TSR)

The Rural Health Technician (TSR) is a relatively new type of community health worker, trained through INDAPS (Institute for the Instruction of Health Personnel,) an AID-sponsored program at Quiriguá. About 80 TSRs are trained annually; there are currently 175 in the country. They are assigned to work out of Health Posts in the nearby communities in a variety of health-related activities, including latrine programs and rural water projects.

The TSRs have received good basic training but have suffered from a lack of adequate supervision and guidance. Just recently a TSR Coordinator was appointed for the El Quiché area and standards

and guidelines for supervising the TSR are being developed for use by the Coordinator. It is anticipated that if this supervision proves effective, it will be adopted in other areas with TSRs. The TSR is discussed further in the Health Sector Assessment under Human Resources Development (See Annex 12.):

2. The Sanitary Inspectors

The MOH Division of Environmental Sanitation works through 150 sanitary inspectors located in 150 Health Centers and a growing corps of TSRs assigned to Health Posts. The sanitary inspectors could, and should, form an important link in the decentralized activities of the MOH in environmental sanitation, water supply, excreta disposal, food handling, solid waste disposal and rabies. However, indications are that the sanitary inspectors need extensive training if they are to fulfill the role expected of them. They are not trained as sanitary inspectors, and it is estimated that as many as 50% of them are not prepared to handle the responsibilities they are given.

The MOH is currently conducting a 9-month course to upgrade the training of the sanitary inspectors but only 30 to 40 of the 150 sanitary inspectors are able to participate in the course each year.

3. The Rural Water Technician (TAR)

The expanded rural water supply program needed to meet the goal of the National Health Plan will require additional intermediate level technicians to form the link between the professional engineer

developing program plans, standards and guidelines at the national or departmental level and the field program where the work is being implemented. The development of this Rural Water Technician, to be known as a TAR, is currently being undertaken by Agua del Pueblo, an AID-funded program. However the program is still in the preliminary development stages.

The TAR concept, including his specific duties, the need for his services, the numbers required, the qualifications and specific training necessary are currently being studied. Careful consideration will be given to the position he will take in the organization, who will supervise him, how he will relate to the sanitary inspectors, TSRs and other members of the health team, and other details which will determine his successful utilization in rural water supply activities.

When the TAR concept is fully developed and implemented, it should be studied carefully, including the development of the training program facilities for training, recruiting techniques, acceptance by the community and the effectiveness of the TAR.

Once developed, the TAR could be utilized by UNEPAR to strengthen and accelerate their program; by DSA to assist the sanitary inspectors now assuming the intermediate level technician responsibility in addition to their other duties; and by DDC which, in attempting to run a comparatively large program with two civil engineers, experiences deficiencies in design and construction supervision.

II RURAL WATER SUPPLY

II.A. THE CURRENT SITUATION

1. Overview

Rural water development projects in Guatemala can be categorized according to the degree of community participation in the project, and the type of water system installed.

Most projects, such as those of the MOH Division of Environmental Sanitation (DSA), the Community Development Office of the Presidency (DDC), USAID/G, CARE, UNICEF, WHO/PAHO-assisted projects and voluntary agencies rely heavily on community participation in all phases of rural water development projects. In contrast, the majority of the projects carried out by the Unidad Ejecutora del Programa de Acueductos Rurales (UNEPAR) with financing by the Inter-American Development Bank (IDB) are developed with practically no community participation.

The majority of the rural systems built in the past and those being considered for the immediate future are gravity-flow systems. Few rural systems have been built which require pumps of any kind, either motorized or hand-operated. In fact, to be included in the CARE/MOH water development project in El Quiché a gravity-flow supply must be available within a reasonable distance. Of 100 systems built and operated by UNEPAR only 11 require motorized pumps. This criterion immediately excludes many rural Guatemalans from a potable water supply.

The MOH maintains 24 Health Areas within the country including 20 sanitary inspector supervisors, 159 Health Centers, each with a sanitary inspector, and 470 Health Posts, which have direct contact

with the communities they serve. Some Posts are assisted by a Rural Health Technician (TSR)*, a relatively new type of community health worker who works in a variety of health related activities, including latrine programs and rural water projects. Plans are currently underway for the development of a Rural Water Technician (TAR)* to assist in the development and maintenance of rural water supply systems.

2. Current Rural Water Development Activities

A number of agencies, including national, international and private voluntary organizations, are involved in rural water development in Guatemala. However the more extensive public rural water supply programs are conducted by three agencies: Rural Aqueducts Program Office (UNEPAR); Environmental Sanitation Division (DSA), and Community Development Office (DDC).

a. Unidad Ejecutora del Programa de Acueductos Rurales (UNEPAR)

Unidad Ejecutora del Programa de Acueductos Rurales (UNEPAR) was established in May 1976 within the MOE to undertake the design, construction, operation and maintenance of rural water supply systems for communities ranging from 200 to 2,000 inhabitants. The Departamento de Ingeniería Sanitaria within the Division of Saneamiento Ambiental (DSA), also a part of the MOH, formerly assumed these responsibilities. (See Figure 1: UNEPAR National Organization Chart and Figure 2: Organization of the Western Region of UNEPAR.)

* See Section 1B for a description of the TSR and the TAR, and Annex 11 Human Resources Development.

FIGURE 1
UNEPAR NATIONAL ORGANIZATION

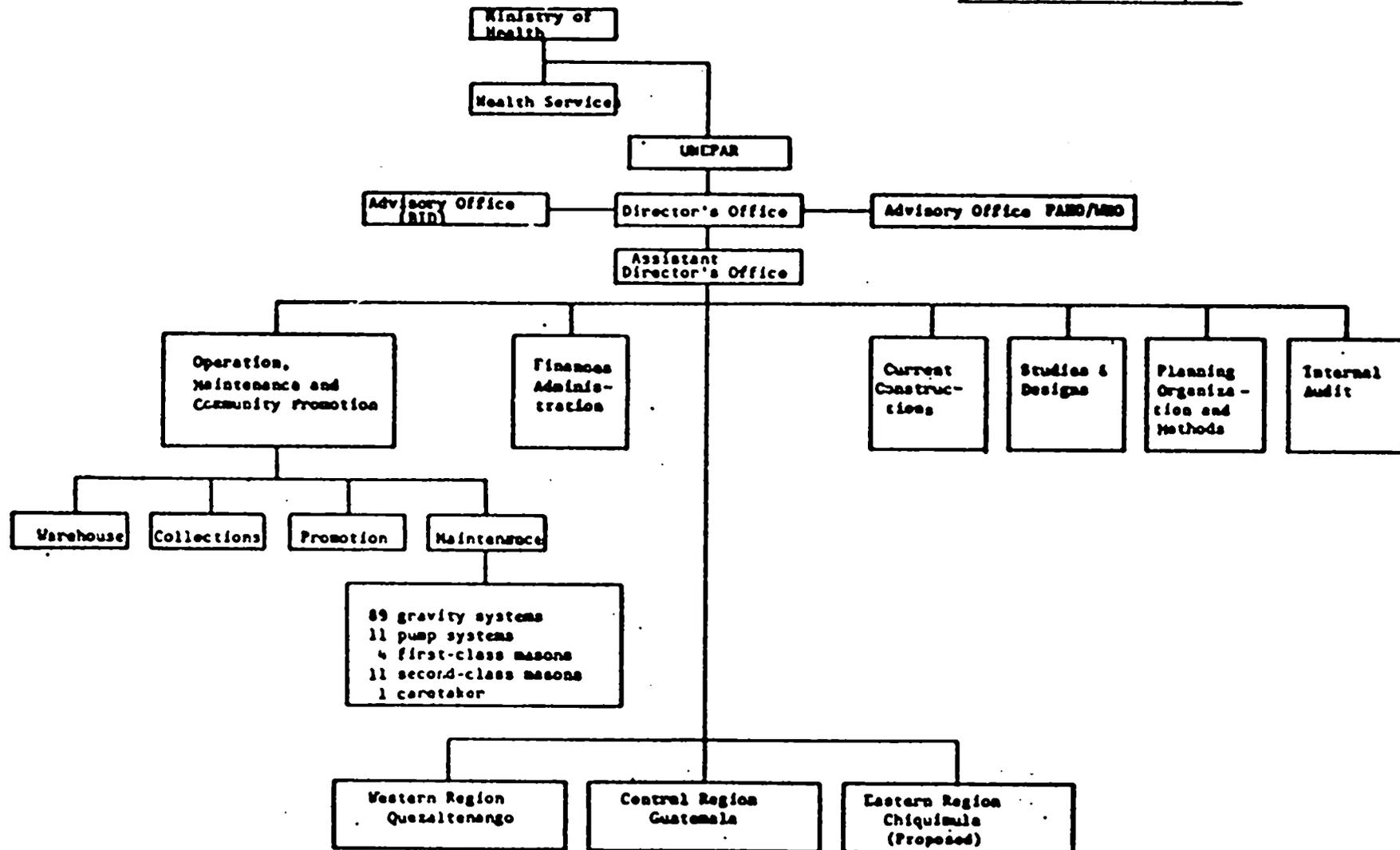
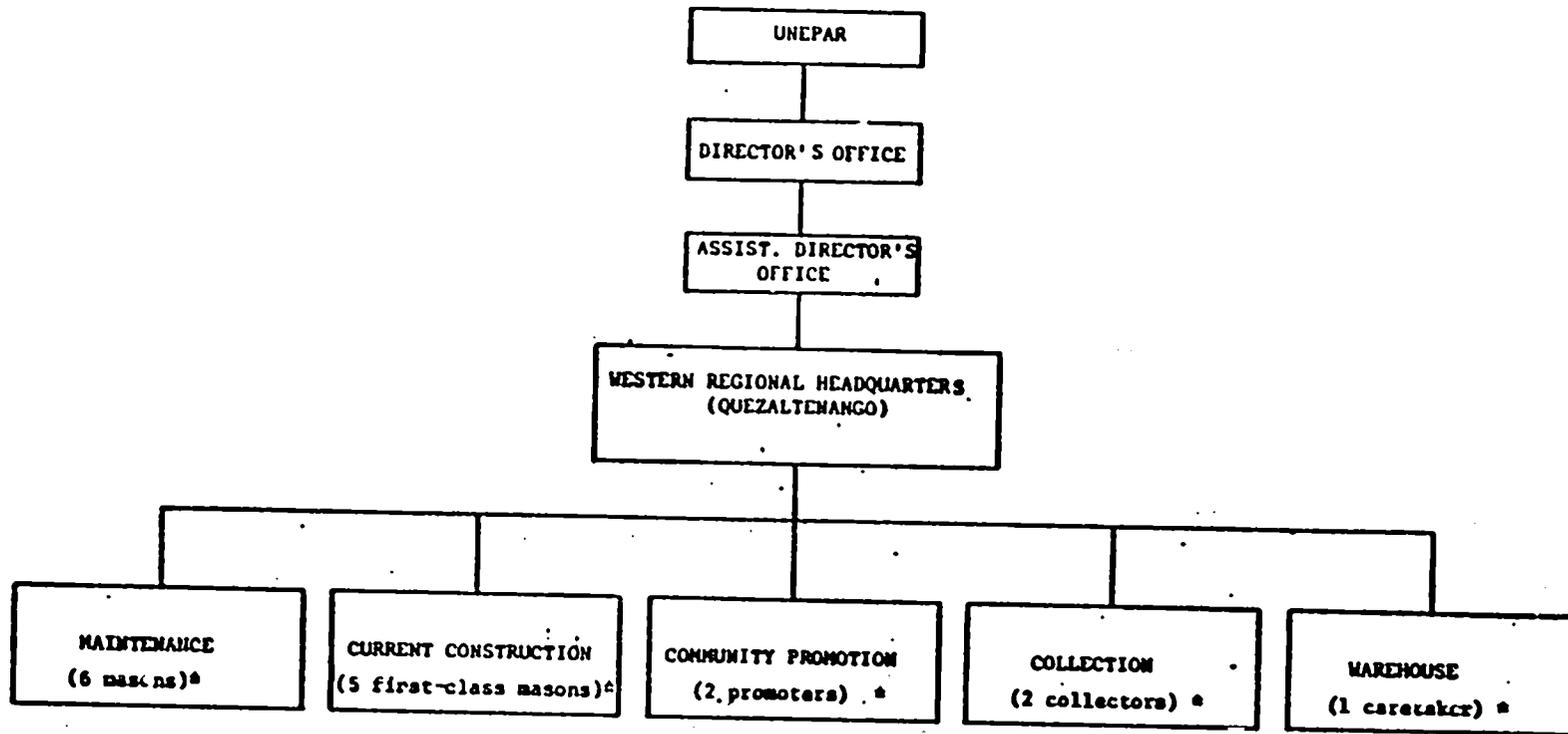


FIGURE 2
UNEPAR
WESTERN REGIONAL ORGANIZATION (QUEZALTENANGO)



* Personnel listed as of April 1977; expected to increase when the first payment begins from the BID loan for rural water systems.

UNEPAR functions through a national level organization and three regional offices: the Central Regional Office in Guatemala City, the Western Regional Office recently established in Quetzaltenango and the Eastern Regional Office about to be set up in Chiquimula. Table 1 depicts UNEPAR activities at these national, regional and community levels.

UNEPAR has direct responsibility for implementing the rural water supply program financed by a \$7 million loan from the Inter-American Development Bank (IDB) and \$2.6 million in national counterpart funds. The loan, approved by GOG Congress on October 5, 1976, covers the design and construction within a four-year period of 105 systems for 135,000 inhabitants in approximately 165 communities with populations between 200 and 2,000.

The people benefitted by the program participate minimally in the projects. A local Water Committee is established to obtain permits for rights of way, for the land on which storage tanks and public hydrants are to be installed and for using the water source. UNEPAR operates separately from the other MDH activities and makes no use of the Ministry's close contact with the community through the sanitary inspector or TSR. Local labor is not used because UNEPAR feels that it slows down the construction process, usually carried out by contract, which must proceed according to a predetermined construction schedule under the IDB financing arrangements.

Efforts focus on installation of house connections; public hydrants are held to a minimum. A flat rate, charged for water received through house connections and for the use of public hydrants, is sent to the

TABLE I

UNEPAR ACTIVITIES AT THE NATIONAL, REGIONAL AND COMMUNITY LEVELS

Responsible for construction, operation and maintenance of rural water supply systems for populations from 200 to 2,000. Practically no relationship with the DSA, sanitary inspectors nor TSRs.

<u>LEVEL</u>	<u>STUDIES AND DESIGNS</u>	<u>CONSTRUCTION</u>	<u>OPERATION AND MAINTENANCE</u>
<u>NATIONAL</u>	All studies and designs prepared at national level, also material lists and costs estimates. Invitation for bids on pipe and fittings and for construction contracts. Annual program and budget prepared at national level. Some promotion carried out from national level, particularly for organizing local water committees.	Construction financed by BID loans and national counterpart funds. No community participation in capital costs.	Maintenance of all systems except those under Western Regional office. Have 4 first-class masons plus 11 second-class masons and one boss to carry out routine. Maintenance of 89 gravity systems and 11 pumped systems. Has large warehouse of materials and supplies. Water rates established.
<u>REGIONAL:</u> Central Western (Eastern to be organized)		Construction carried out under supervision of Regional offices. About 67% of construction by administration, remainder by contract awarded to qualified contractors. Expect to award contracts for 3 groups of communities, divided geographically. Supervision by Regional office staff and first-class masons.	Western Region has six masons to maintain gravity systems in 75 communities plus 3 pumped systems. Maintains small supply of pipe and fittings.
<u>COMMUNITY</u>	Promoters help set up local Water Committees. Villagers provide labor to assist survey team make studies. Villagers obtain permits for use of water sources, rights of way, and so forth.	Villagers provide labor and local material for systems built by administration.	Local Water Committee is responsible for operation and maintenance of systems under supervision and guidance of Regional Office. Water rates, established at National Level, are collected by Treasurer of Water Committee under supervision of Regional and National office of Collections. Treasurer receives 10% of money collected, remainder goes to National Treasury. Fund budget annually for operation and maintenance costs.

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Regional Office for deposit in the National Treasury. Funds for operation and maintenance are then budgeted annually as part of the UNEPAR budget. (See Figure 3: UNEPAR, Comparison of Accumulated Operation and Maintenance Costs with Accumulated Income Generated, 1973-1976.)

In order to provide water service to as many people as possible with the funds available (estimated at \$70/capita), the majority of the systems in the UNEPAR program will be gravity systems; however, eventually the program will have to include pumped systems using ground water sources.

The Canadian International Development Agency (CIDA) has agreed to assist UNEPAR with an \$1.8 million grant to: (a) study possible water sources, including the ground-water potential; (b) develop a national rural water supply plan for the next decade; and (c) train people in hydrology and the development of ground-water resources, and in the planning, operation and maintenance of rural water supply systems.

UNEPAR also has a \$3.5 million loan to finance the rebuilding of some 250 systems destroyed or damaged by the recent earthquake.

The progress made by UNEPAR, formerly the Department of Sanitary Engineering, during the past 5 years in supplying rural water supply services is shown in Figure 4 and Table 2.

b. Division de Saneamiento Ambiental (DSA)

When UNEPAR was established the Department of Sanitary Engineering within DSA was practically eliminated, and DSA was left with a Department of General Sanitation and a Department of Food Control. Currently the DSA is responsible for a national latrine program, a water supply program for small communities, an emergency program with UNICEF to rehabilitate

FIGURE 3

UNEPAR

COMPARISON OF ACCUMULATED OPERATION AND MAINTENANCE COSTS
WITH ACCUMULATED INCOME GENERATED 1973 - 1976

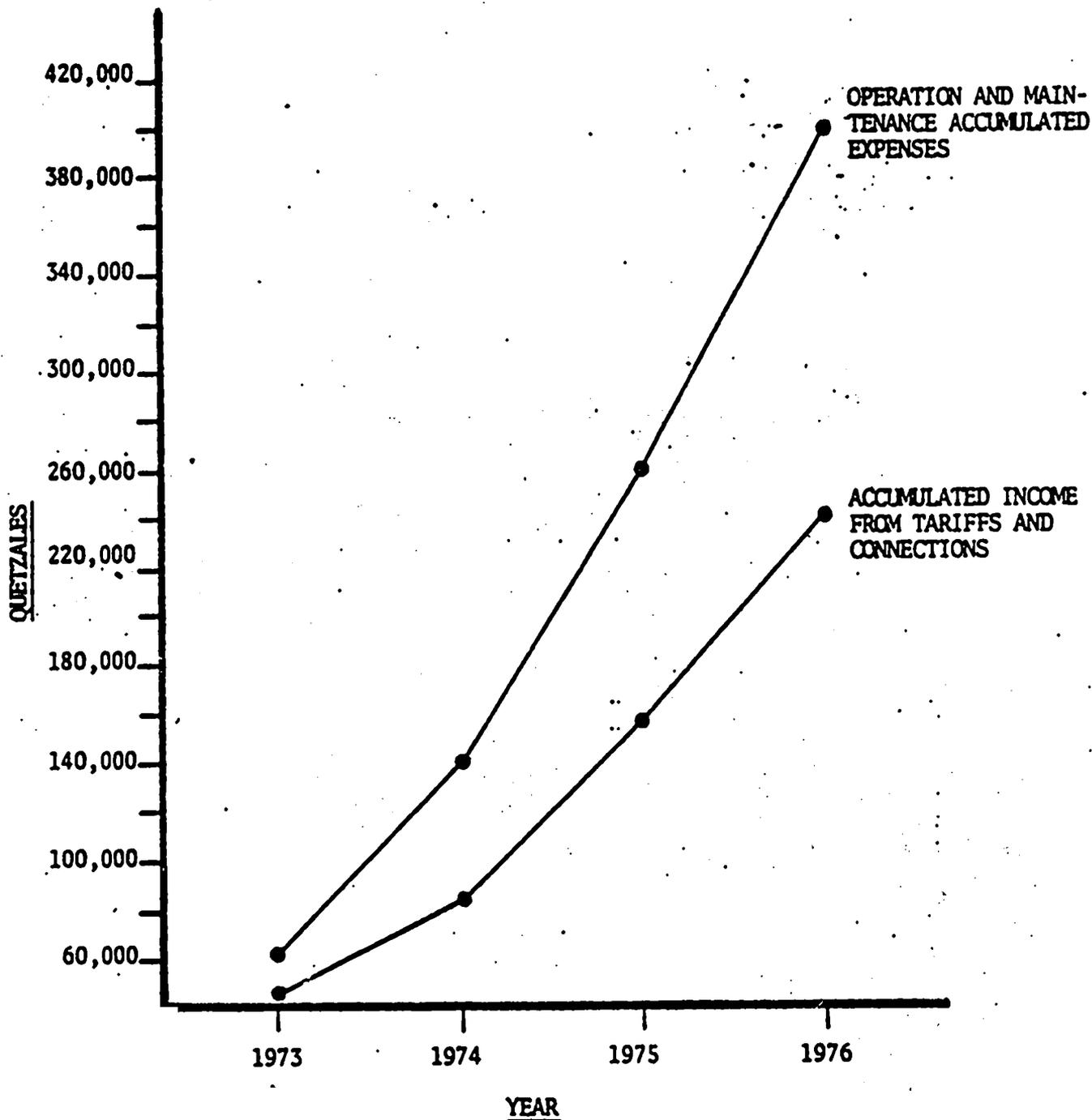
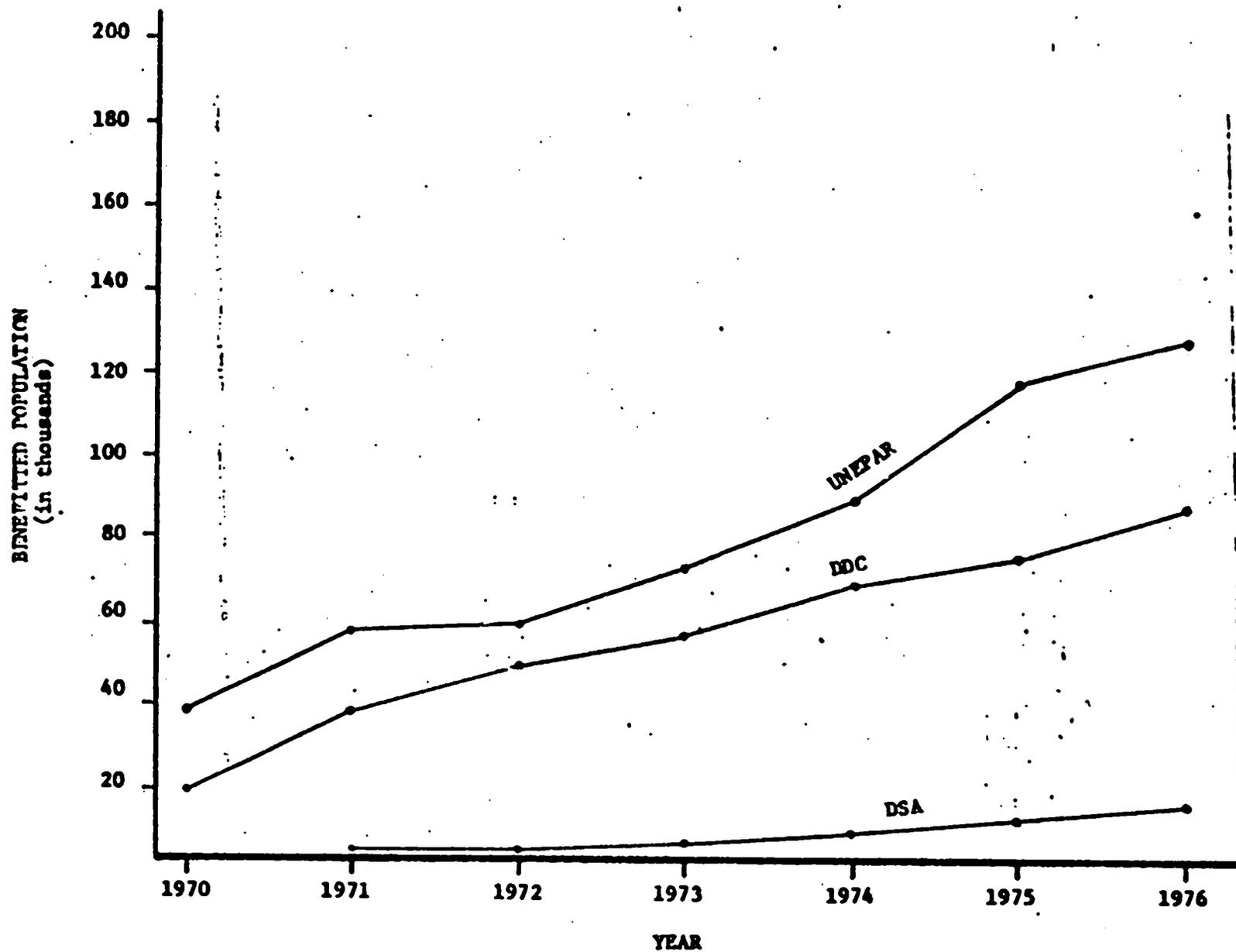


FIGURE 4

PROGRESS MADE IN PROVIDING RURAL WATER SUPPLIES IN THE LAST FIVE YEARS, BY UNEPAR*, DDC & DSA



* Formerly the Department of Sanitary Engineering.

TABLE 2
RURAL POTABLE WATER AND LATRINES
MON, UNEPAR AND DSA

(1) ASD	(2) Preliminary Visits and Appraisals	(3) Surveys	(4) Completed Studies	(5) Communities Benefitted by (4)	(6) Works in Progress or completed	(7) Works Completed Under Contract	(8) Total Works Completed	(9) Current Population benefitted by (8)	(10) Design population (for (8))	(11) Income from Tariffs and Connections	(12)** Maintenance & Operation Costs	(13)** Maintenance and Operation Losses	(14) Latrines Constructed	(15) Mini-aqueducts Completed	(16) Population benefitted by (15)
1970	197	37	36	58	31	16	24	38,071	51,962	41,232 [*]	----	----	8,115 ^{***}	----	----
1971	171	41	19	26	16	3	9	19,930	-----	31,035	----	----	9,656	7	1,392
1972	268	30	27	32	15	--	10	3,418	5,545	40,248	----	----	11,916	8	----
1973	146	34	28	56	32	--	16	13,716	22,739	42,980	63,775	20,795	11,500	5	2,277
1974	133	25	47	--	38	--	21	16,353	25,166	44,869	75,451	30,582	3,600	14	4,335
1975	94	47	26	45	34	19	25	27,992	49,866	69,782	119,765	49,983	14,000	26	4,387
1976	121	48	27	31	15	--	9	9,347	16,728	81,099	130,814	49,712	23,500	19	4,423
								128,827							16,814

← STUDIES AND PROJECTS DEPARTMENT →

← CONSTRUCTION DEPARTMENT →

← FINANCIAL-ADMINISTRATIVE DEPARTMENT →

← GENERAL SANITATION DEPARTMENT →

* Accumulated up to 1970.

** Data taken from table prepared by Lic. Barraza, Chief of Financial-Administrative Department, UNEPAR.

*** Installed Latrines.

Prepared by: Carlos Durán Escobar, S.G.C.N.P.E.

Source: Work summary of the years 1970 to 1975, furnished by Ing. Angel Balcarcel, Chief of the Planning Division, UNEPAR.

Date: March 25, 1977

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small water supply systems and latrines in the earthquake area and the CARE/MDH program being carried out in El Quiché. These programs are conducted with full community participation in close coordination with the TSRs and the local program provided through the Ministry of Health.

The following data indicate the size of the projects included in the DSA small-system program, the degree of local participation and the per capita cost. All information is for 1975.

Number of systems reported	15
Number of people served	3,176
System size, maximum-minimum population	360-70
Average system size, population	212
Per capita cost, maximum-minimum	\$19-\$7
Average per capita cost	\$18.80

Source of funds:

Community	53%
Funds	21%
Labor	32%
DSA funds	26%
Other funds	21%

Thus, more than 50% of the cost, either in cash (21%) or labor (32%), is contributed by the people who receive the services.

Most water supply systems built under DSA programs are gravity-supplied. Except for the systems installed under the CARE/MOH demonstration project in El Quiché, water service generally is provided at no charge through public hydrants. When sufficient water is available a few house connections are made, the householder pays the connection cost. A collection is made when there are minor costs, major repairs are handled with the assistance of the sanitary inspector assigned to the Centro de Salud.

The current DSA organization and that of the MOH sections involved in environmental sanitation programs is presented in Figure 5.

The DSA responsibilities for water system study, design, construction, operation and maintenance at national, area, division and Puesto de Salud levels are summarized in Table 3.

The rural water supply and latrine program of DSA is augmented by a CARE/MOH 3-year program in El Quiché known as Sanesamiento Rural Quiché, which is to provide a water supply and latrine facilities to at least 25,000 people and to demonstrate techniques and methodology with widespread applicability to similar projects in other areas of Guatemala.

The program provides public faucets (house connections may be provided at the householder's expense) and latrines, a monthly 25-cent charge covers operation and maintenance costs of the water supply system. The efforts of CARE, DSA, local community improvement committees, and the TSRs and sanitary inspectors of the MOH are coordinated within the project.

**FIGURE 5
ORGANIZATION OF HEALTH SERVICES AND ENVIRONMENTAL SANITATION DIVISION**

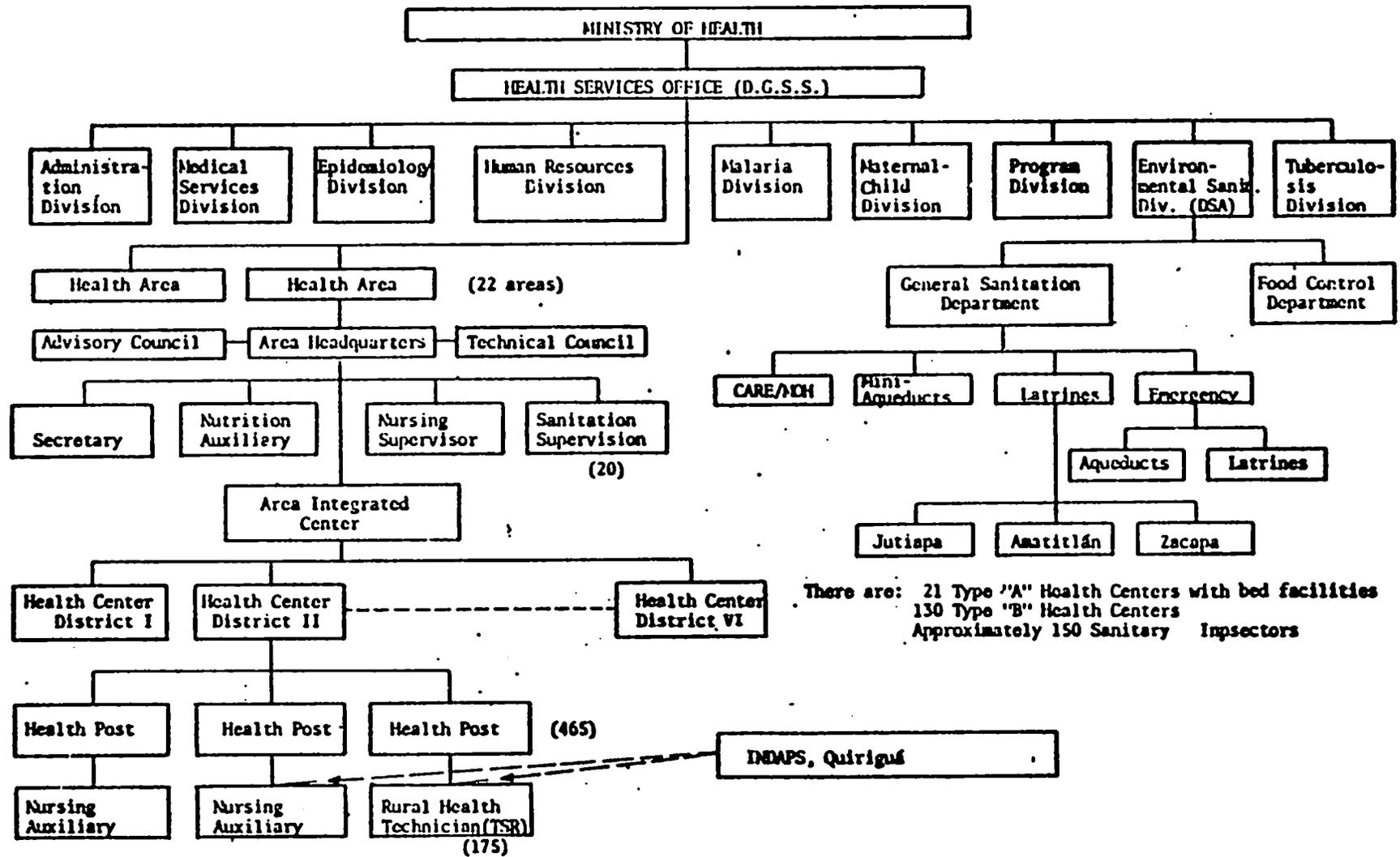


TABLE 3

RESPONSIBILITIES OF THE DIVISION DE SANITAMENTO AMBIENTAL (DSA) FOR DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE OF WATER SYSTEMS & LATRINE PROGRAMS AT THE NATIONAL, AREA, DIVISION & LOCAL LEVELS

Responsible for construction of small water supply systems and latrine program. Unrelated to UNEPAP.

LEVEL	STUDIES AND DESIGNS	CONSTRUCTION	OPERATION AND MAINTENANCE
NATIONAL (DSA)	Prepares country-wide small rural water supply program, also latrine program. Approves studies and designs carried out by sanitary inspectors. Orders and dispatches materials and supplies for water supply and latrine programs.	Responsible for construction of latrine slabs and risers in three plants and distribution throughout country.	
AREAS (24) Sanitary Inspector Supervisor	Supervises activities of sanitary inspectors in Centros de Salud. Reviews studies and designs made by sanitary inspectors. Prepares more complicated design.	Supervises sanitary inspectors who are in charge of construction of small rural water supply projects.	
DIVISIONS (6) Centro de Salud (159) Sanitary Inspector (approx. 150)	Sanitary inspector makes surveys and prepares designs for simple systems. Makes material lists and cost estimates, all checked by sanitary inspector superior.	Supervises construction work carried out by villagers.	Provides assistance for major repairs beyond capacity of local Water Committee.
Puestos de Salud (470) TSRs (175)	TSRs help to set up local committees, including Committee for Water Supply and Latrine Programs. Help in promotion of programs. Make sanitary surveys.	Assist in campaign for installing privies. Indicate location of privy, size of pit, advise on construction of shelter.	Advise on use and maintenance of water supply system and privies.
VILLAGES	Water Supply and Latrine Committees set up. Villagers assist in making survey. Obtain rights for use of source and rights of way. Decide where stand pipes are to be installed.	Provide local material and labor for construction of water system. Dig hole for privy and construct the shelter over privy.	Operation and maintenance of water system and privy is responsibility of village. No charges made for water services nor for privy slab and riser. Minor repairs are financed and carried out by Water Committee, for major repairs assistance is requested from sanitary inspector.

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To be included in the program, communities must meet the following criteria:

1. The water source must (a) be higher than the highest point in the community to allow for the use of a gravity-flow system; (b) have capacity to accommodate the demand of the population projected for 20 years; (c) be less than 6 kilometers from the center of the population.
2. The community must organize a committee, with the assistance of the TSR, which will actively participate in the execution of the project and in the operation and maintenance of the facilities provided by the project.

The project is financed by the following agencies:

AID (materials, equipment and personnel)	\$250,000
MOH (materials)	350,000
CARE (personnel and operations)	<u>47,304</u>
	\$647,304*

* Community participation contribution not included.

One project⁽¹⁾ consisting of 27 house connections and 27 public hydrants to serve a population of 1,020 in two adjacent communities cost the following:

<u>Source</u>		<u>Expenditure</u>	<u>% of Total</u>
DSA ..		\$ 2,643	22%
Materials :	\$ 2,395		
Latrines	798		
Transportation	450		
Local Skilled Labor		1,500	9%
Community Labor		8,034	49%
5,770 man-days at \$ 1.36	7,847		
Materials	187		
CARE ...		3,235	20%
Materials	3,235		
		16,412*	

* Does not include cost of technical personnel.

The total cost for this system represents a per capita cost of \$16.10; the community supplied almost 50%.

(1) Documentation of the CARE/Ministry of Health Potable Water and Latrine Project "CHIJTINIMIT", compiled by P. K. Buckles, October 1976.

A second supplement to the DSA rural water and excreta disposal programs is a cooperative UNICEF/MDH/PAHO basic sanitation program for rural areas devastated by the recent earthquake. The program provides for the rehabilitation of 63 water supply systems, the improvement of 50 wells and the installation of 20,000 latrines during a one year period starting in April 1977.

The following funding is provided:

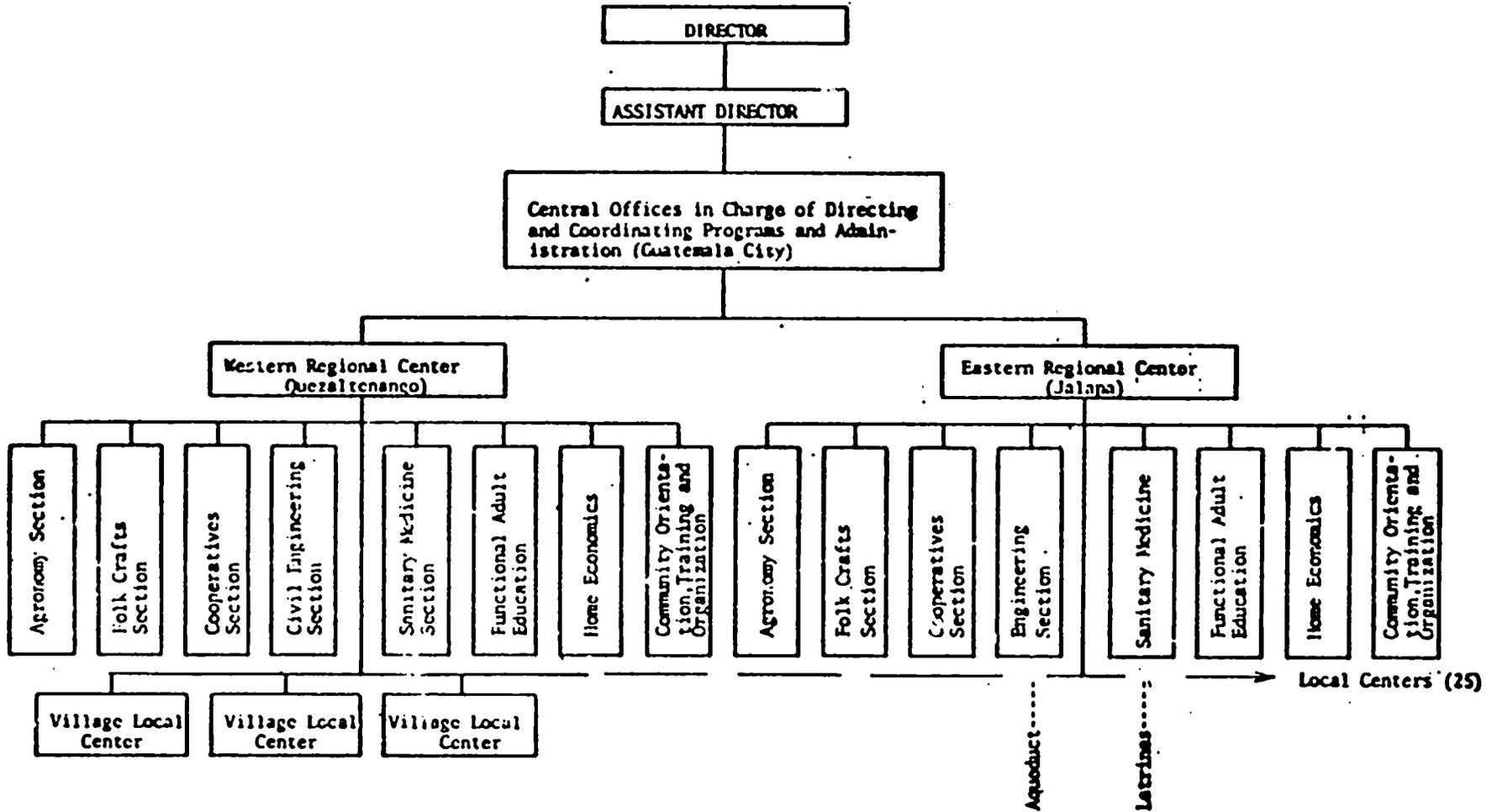
<u>Source</u>	<u>Expenditure</u>	<u>% of Total</u>
UNICEF	\$575,000	53%
OPS/QMS (PAHO /WHO)	60,000	6
FMA	50,000	5
MDH	224,800	21
Community	<u>161,600</u>	<u>15</u>
	\$ 1,071,400	100%

Additionally the World Food Program is contributing food valued at \$50,000 to be provided the workers who cooperate with the program.

c. Dirección de Desarrollo de la Comunidad (DDC)

The Dirección de Desarrollo de la Comunidad, a dependency of the Presidency of the Republic of Guatemala, includes among its extensive activities a program for providing water supply and excreta disposal facilities for rural populations. This program is carried out with CARE-financing through two Regional Centers in Chimaltenango and in Jalapa, and 25 Local Centers. The water supply activities are the responsibility of the civil engineers in the Regional Centers and of the social workers in the Local Centers. (See Figure 6: DDC Organization Chart).

FIGURE 6
ORGANIZATION OF THE COMMUNITY DEVELOPMENT OFFICE (CDO)



Local Centers Include: Social Promoter, Social Worker, Home Economics Teacher, Agronomist, Auxiliary Nurse, Adult Education Teacher

There is some coordination between DDC and DSA in their rural water supply and latrine programs and their approaches are similar in that each encourages community participation. Local committees are organized which become responsible for operation and maintenance when the systems are completed. No charge is made for the water services which are generally provided through public hydrants. Most systems are supplied by gravity.

During the last 7 years, DDC constructed 84 water systems for 89,500 people with the following pattern of financing:

<u>Source</u>	<u>Expenditure</u>	<u>% of Total</u>
DDC	275,751	40%
Municipal	25,637	4
Community	118,371	17
International Organizations	<u>270,629</u>	<u>39</u>
	<u>690,388</u>	<u>100%</u>

The per capita cost over the seven year period is \$ 7.71.

3. Progress since 1970 in Providing Rural Water Supply Services

Statistics provided by CEIAD (Table 4), based on the 1973 census, indicate that while the percentage of the total population which is rural is expected to decrease (from 67% in 1970 to 60% in 1980), the absolute rural population of Guatemala increased from 3.54 million in 1970 to 3.89 million in 1975 and is expected to reach 4.23 million in 1980.

During the past seven years there has been a small percentage gain from 11% in 1970 to 14% in 1976 of the rural population with water supply services, an increase of 152,300 people. (See Figure 7: Population Growth 1970-1985 Rural Population with Water Supply Services 1973-1980, and Table 5: Rural Population with Water Supply Services in 1970 and 1976.)

According to statistics furnished by UNEPAR, DAS (Table 2), and DDC (Table 6) a total of 235,117 rural people have benefited by water supply systems installed during the years 1970-1976:

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>TOTAL</u>
UNEPAR	38,071	19,930	3,418	13,716	16,353	27,992	9,347	128,827
DSA	-	1,392	-	2,277	4,335	4,387	4,423	16,814
DDC	<u>18,957</u>	<u>19,086</u>	<u>11,222</u>	<u>9,910</u>	<u>10,275</u>	<u>5,349</u>	<u>14,677</u>	<u>89,476</u>
TOTAL BENEFIT- CIUDADANOS	57,028	40,408	14,640	25,903	30,963	37,728	28,447*	235,117

* Includes the rehabilitation of systems damaged by the 1976 earthquake.

The average of 33,600 people benefited per year, during this 7-year period.

An estimate of the capital funding for construction of rural water supply systems provided by UNEPAR, DSA and DDC during the period 1970-1976 is tabulated in Table 7 and shown graphically in Figure 8.

TABLE 4

GUATEMALA: URBAN AND RURAL POPULATION PROJECTION BY DEPARTMENT

DEPARTMENT	POPULATION IN THOUSANDS									
	1970		1973		1975		1980		1985	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
National	1,735.8	3,545.8	2,007.6	3,743.3	2,208.2	3,879.0	2,784.4	4,233.6	3,490.6	4,612.6
1. Guatemala	902.7	175.1	1,053.5	165.2	1,165.9	154.7	1,492.0	131.0	1,883.0	110.7
2. El Progreso	14.7	60.7	16.2	62.6	17.2	63.8	19.4	66.1	22.2	66.6
3. Sacatepéquez	62.9	30.0	68.7	28.4	72.7	27.1	83.3	22.5	93.8	16.6
4. Chimaltenango	66.1	121.5	71.4	125.5	74.9	128.2	83.6	134.9	93.4	140.1
5. Escuintla	97.2	287.4	123.2	326.6	144.1	355.1	211.6	436.2	306.9	531.6
6. Santa Rosa	25.1	161.0	28.0	170.3	30.0	176.7	35.1	193.3	41.4	209.5
7. Sololá	31.5	90.5	34.6	92.1	36.6	93.2	41.7	94.9	47.6	91.4
8. Totonicapán	18.1	149.7	19.7	159.0	20.8	165.3	23.8	181.5	27.0	196.0
9. Quetzaltenango	115.4	210.7	132.7	217.9	145.2	222.6	180.6	233.0	222.5	242.0
10. Suchitepéquez	59.2	166.3	63.8	173.9	76.0	178.8	96.8	190.1	121.4	200.5
11. Retalhuleu	35.7	116.6	40.5	122.0	43.9	133.0	52.9	163.9	63.4	194.3
12. San Marcos	32.4	371.2	38.0	394.9	42.0	411.4	53.5	454.8	68.3	500.9
13. Huehuetenango	40.5	302.2	48.6	317.7	54.7	328.1	72.6	353.7	96.7	377.6
14. Guiché	28.9	263.2	32.5	294.9	35.0	296.5	41.4	327.3	49.1	359.9
15. Baja Verapaz	11.2	103.3	12.3	109.5	13.1	113.6	14.5	124.7	16.4	135.0
16. Alta Verapaz	24.5	279.7	27.7	291.3	29.7	304.5	34.5	331.6	41.0	354.7
17. Petén	7.5	25.0	8.2	26.8	8.8	27.9	10.3	29.7	12.1	30.2
18. Itzabal	42.3	121.0	46.9	142.1	50.1	158.3	58.4	207.5	67.9	271.4
19. Zacapa	24.6	87.8	27.4	91.2	29.3	93.4	34.1	98.3	39.6	101.7
20. Chiquimula	38.4	133.7	45.5	135.0	50.7	135.4	66.0	133.8	85.6	127.4
21. Jalapa	32.0	80.7	36.2	81.2	39.1	81.2	46.8	80.3	56.3	76.1
22. Jutiapa	24.9	203.5	27.0	215.2	28.4	223.2	31.5	244.5	35.0	266.4

Note: a) The National totals were provided by CELADE.

Source: National Economic Planning Council.

FIGURE 7

POPULATION GROWTH, 1970-1985
AND
RURAL POPULATION WITH WATER SUPPLY SERVICES, 1973-1980

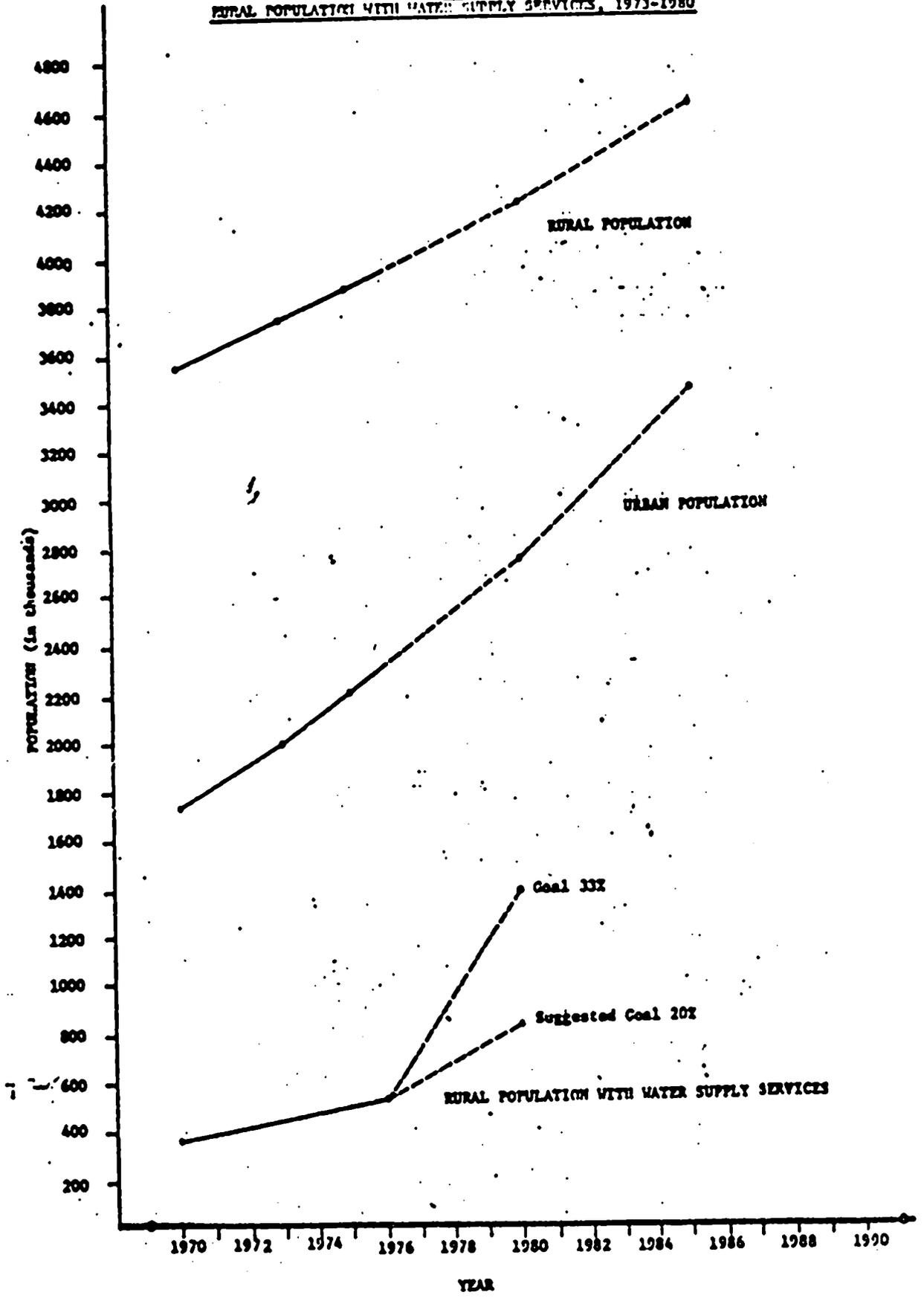


TABLE 5

RURAL POPULATION WITH WATER SUPPLY SERVICES
1970 & 1976

	RURAL WATER SUPPLY 1976		RURAL WATER SUPPLY 1970	
	Benefitted Population	% of Total Rural Popul.	Benefitted Population	% of Total Rural Popul.
Quatemala	55.8	29	50.6	29
Progreso	14.1	23	11.3	20
Sacatepéquez	14.3	47	14.0	50
Chimaltenango	33.9	25	26.3	23
Escuintla	16.1	7	13.3	4
Santa Rosa	25.1	16	17.0	12
Solalá	31.7	33	22.5	27
Totonicapán	27.2	17	19.9	14
Quetzaltenango	61.6	27	57.6	28
Suchitepéquez	12.8	8	12.7	8
Retalhuleu	3.0	3	2.7	2
San Marcos	44.5	12	23.2	7
Ehmetenango	46.2	13	26.5	9
Quiché	15.1	5	9.7	4
Baja Verapaz	6.9	7	1.0	1
Alta Verapaz	13.2	5	9.4	4
Petén	-	-	-	-
Isabel	23.4	15	10.7	8
Zacapa	20.5	23	9.0	11
Chiquimula	16.8	11	1.8	1
Jalapa	4.8	5	3.9	5
Jutiapa	43.5	20	35.1	19
TOTAL	530.5	14	378.2	11

There is some disparity in the number of people with water supply services in 1976 compared with those served in 1970; figures showed be viewed with respect to magnitude. The 1976 figures are used in this report.

TABLE 6

THE INTRODUCTION OF POTABLE WATER AND INSTALLATION OF LATRINES BY THE COMMUNITY DEVELOPMENT OFFICE (DDC) OF THE PRESIDENCY OF THE REPUBLIC. 1970 - 1976

	7 year Total	1970	1971	1972	1973	1974	1975	1976
Potable water projects introduced	84	9	11	12	15	21	7	9
Inhabitants benefited	89,476	18,957	19,086	11,222	9,910	10,275	5,349	14,677
Total amount invested	\$ 690,387.99	148,149.94	82,355.37	94,719.66	93,807.72	131,033.10	78,423.99	93,455.05
National Investment (DDC)	275,751.39	65,758.22	30,878.21	34,872.92	34,547.83	53,326.15	21,611.05	34,757.01
Local Investment (municipal)	25,637.05	5,331.70	2,559.05	3,581.60	3,131.30	3,359.00	2,402.50	5,235.90
Community Investment	118,370.62	12,920.35	17,108.65	19,785.22	21,846.46	21,461.01	10,108.49	15,140.44
International Investment	270,628.93	64,139.67	31,809.46	4,923.17	34,282.13	52,850.85	44,301.95	38,321.70
Latrines installed	13,676	1,900	2,782	4,222	2,319	1,770	452	285

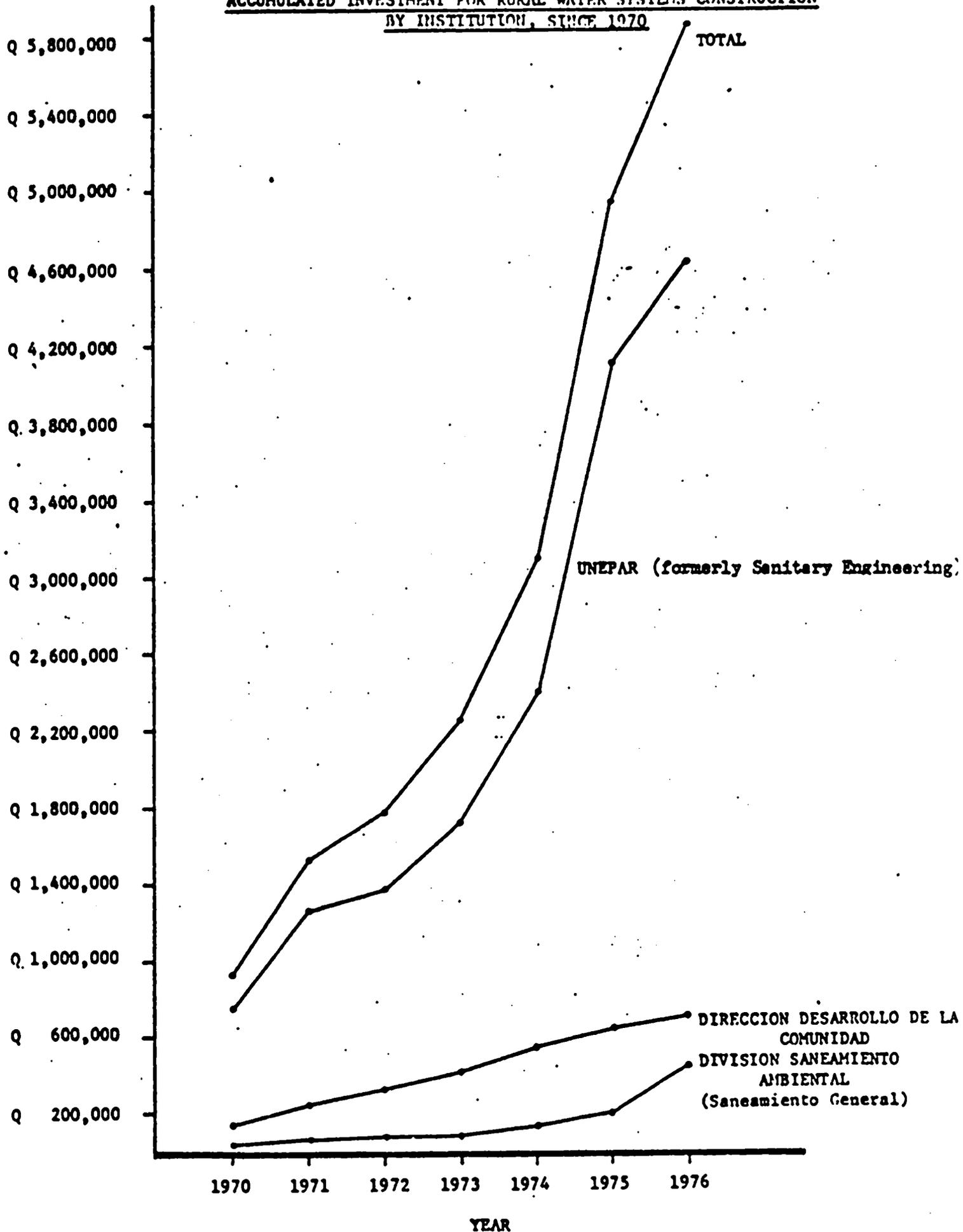
Source: Orientation, Training and Community Organization Division
National Program for Community Organization Office of the
Presidency of the Republic. Guatemala, March 18, 1977.

5.11-29

TABLE 7
INVESTMENT IN RURAL AQUEDUCTS BY INSTITUTION

	UNEPAR (formerly Sanitary Engineering)	GENERAL SANITATION (Environmental Sani- tation Division)	OFFICE OF COMMUNITY DEVELOPMENT	TOTAL
1970	\$ 753,011	\$ 15,000	\$ 148,150	\$ 916,000
1971	508,146	15,049	82,355	605,000
1972	104,098	40,430	94,720	239,000
1973	362,255	19,963	93,808	476,000
1974	672,483	63,001	131,033	866,000
1975	1,723,174	53,740	78,424	1,855,000
1976	549,715	282,512	93,455	925,000
TOTAL	\$ 4,672,882	\$ 489,695	\$ 721,945	\$ 5,882,000

ACCUMULATED INVESTMENT FOR RURAL WATER SYSTEMS CONSTRUCTION
BY INSTITUTION, SINCE 1970



4. Quality and Availability of Information

The rural water supply program is fragmented under several agencies which makes it difficult to determine the present situation or the progress made in the recent past. Information obtained from UNEPAR, DSA and DDC includes work financed by national, international and bilateral sources and by CARE. The work of other private voluntary organizations (PVOs) is not tabulated nor is data available for private fincas, ranches or other private landholdings; however, these latter probably constitute a comparatively small part of the whole and do not bear significantly on the water supply or excreta disposal assessment.

5. Comparison of the Situation with GOB Plan Objectives

It is a goal of the National Health Plan, 1975-1979, to provide water supply services for 33% of the rural population by the end of 1979. This will require the construction of water supply systems to serve approximately 890,000 people during the period 1975-1979, or 178,000 people per year for each of five years, over 5 times the average number of people per year provided with water supply services during the 1970-1976 period.

The UNEPAR program plans to provide water to 135,000 people during the next four years. A shallow well program proposed in this report, if approved, could provide a water supply for 100,000 rural people. The DDC program, if continued at 1976 level, could provide a water supply for an additional 60,000 people in 4 years. If, in fact, these additional 295,000 people in rural areas are provided with water services then about 20% of the rural population will have water supply services by 1980. Although this is short of the goal established by the National Health Plan, even this will be an appreciable 56% increase over the population with water services in 1976.

In addition to providing the new services mentioned above, UNEPAR is cooperating with CIDA in rebuilding 250 systems damaged by the earthquake and DSA is working with UNICEF to rehabilitate 63 water supply systems and improve 50 wells.

6. Operation and Maintenance Capability

Gravity-flow water systems, which comprise the majority of the rural water systems in Guatemala, present minimal operation and maintenance problems. Hand and motor-operated pumps complicate operation and maintenance procedures which must be developed prior to the onset of problems in order to avoid long delays in service. Preventive maintenance is the most effective, including regular inspection, replacement of worn out parts before they fail, identification and correction of weakened areas before they give way. However even the simplest maintenance requires that someone capable be responsible for making repairs and that spare parts be readily available.

UNEPAR has two maintenance brigades, one at the national level and one at the regional office in Quetzaltenango. These brigades respond to problems when they can, provided they have transportation, per diem, and the necessary spare parts, but they cannot cover adequately all the systems for which UNEPAR is responsible throughout the whole country. UNEPAR delegates the responsibility for operation and maintenance of its water supply system to the local Water Committee, supervised by the UNEPAR Regional Office; thus, problems often go unattended unless the local Water Committee can solve them.

DSA and DDC also turn over their water supply systems to the local Water Committees for operation and maintenance but without instituting

even the rudimentary provisions made for the UNEP/R-constructed systems. Except for the systems being built in El Quiché by CARE/MOH (Saneamiento Rural Quiché), the local Water Committee must raise money when repairs are necessary. In difficult cases assistance can be sought on an ad-hoc basis from the nearest health inspector.

II.B. ANALYSIS OF THE PROBLEM/SITUATION

1. Causes of the Problem

(a) Lack of Planning and Coordination

The Health Unit of the MOH Planning Council does not include an independent data collection system and must depend on the various Ministries within the GOC for planning data.

This lack of overall data makes it impossible to plan the most appropriate method for achieving the goal of the National Health Plan with respect to a potable rural water supply.

The lack of planning is evident when the percentage of the rural population served by water systems varies from 8% or less in eight Departments to 33% or more in two Departments. (See Table 8.)

Currently those agencies engaged in rural water supply activities do not coordinate their efforts in any area, including construction, design standards, or degree of cooperation expected from the beneficiaries.

A national rural water supply plan, to be prepared with the assistance of the Canadian International Development Agency (CIDA), should help to improve this situation. (The CIDA project will also study possible water sources, including the groundwater potential which will make it possible to plan and develop water supply programs based on the use of motor-operated and hand-pumped facilities.)

TABLE 8

COMPARISON OF POPULATION DENSITY 1973 AND
PERCENTAGE OF RURAL POPULATION
WITH WATER SUPPLY SERVICE 1975

	<u>Population</u> <u>Density 1973</u> <u>(People/Km²).</u>	<u>Percent of</u> <u>Rural</u> <u>Population</u> <u>Benefited by</u> <u>Water Supply</u>
Guatemala	381	29
Sacatepéquez	174	47
Quetzaltenango	139	27
Totonicapán	134	17
Solalá	102	33
Chimaltenango	82	25
Suchitepéquez	74	8
Chiquimula	63	11
Retalhuleu	63	3
Escuintla	62	7
Jutiapa	61	20
Santa Rosa	53	16
Jalapa	48	5
San Marcos	39	12
Huehuetenango	39	13
Zacapa	36	23
El Progreso	34	23
Baja Verapaz	31	7
Alta Verapaz	30	5
El Quiché	30	5
Isabel	13	15.
Petén	1	-

(b) Inadequate Operation and Maintenance Support

UNEPAR attempts to operate and maintain its systems from a central office in Guatemala and from one regional office, each of which supports a maintenance brigade and is stocked with a small amount of spare parts. An eastern regional office is planned but this is far short of the decentralization necessary for the study, design and construction phases of the program and for the operation and maintenance phase which will become more demanding as more systems are built and the use of pumped systems increases.

No formal maintenance support is provided by the other agencies who design and construct water supply systems; supervision from one level to the next lower level is weak in most agencies. Water systems are turned over to the local Water Committees for operation and maintenance. When breakdowns occur which are beyond the local capacity for repairs, assistance is sought from the sanitary inspector at the Centro de Salud for DSA-installed systems, or from the civil engineer at the regional center level for DDC-installed systems. Thus, many systems are out of operation for long periods of time because of lack of adequate maintenance support.

The operation and maintenance costs for rural water supply systems are obtained by three different methods:

UNEPAR charges the users 50-cents per month for service through house connections and 25-cents per month for use of public hydrants, regardless of the initial cost of the system or of the

actual cost of operation and maintenance. This money goes directly to the national treasury, and funds to cover operation and maintenance costs are provided through the annual budget. No incentive is provided to keep collections up-to-date and there is no relation between expenses and income. (See Figure 3: UNEPAR, Comparison of Accumulated Operation and Maintenance Costs with Accumulated Income Generated, 1973-1976.)

DSA and DDC make no charge for water services. Minor repairs are covered by a collection taken among the users, and assistance is requested from the local Puesto or Centro de Salud for major repairs.

The CARE/MOH program in El Quiché, charges 25-cents per month per family for water supply services. The money is retained by the local water committee in a special bank account until \$1000 has been accumulated to be used exclusively for the operation and maintenance of the system; additional funds may be used for other community projects. Thus, the water supply system becomes a business venture and is administered as such while taking advantage of its potential as a source of community income.

(c) Inadequate Staffing and Personnel Training

UNEPAR is presently understaffed and the problem will grow worse as it expands its program. As the number of systems increases for which UNEPAR is responsible, and as more systems are motor-

operated, an extensive decentralized UNEPAR organization for operation and maintenance will be necessary requiring new regional offices, and the training of additional technical, administrative and supervisory staff. More maintenance crews will be needed, especially as the proportion of pumped-systems increases, as well as additional regional warehouses and warehousemen. The staff in charge of training the treasurers of the local Water Committees and making collections will have to be expanded, and adequate accounting controls will have to be established.

The activities of the TSRs have been handicapped by a lack of adequate supervision and guidance. A start at resolving the problem has been made in El Quiché by the designation of a TSR Coordinator. Currently there is no system for periodic evaluation of the performance of the TSRs, or feedback of the TSRs' performance to the INDAPS training institute at Quirigua so that the training program can be modified as required.

Estimates are that as many as 50% of the MOH sanitary inspectors are not trained nor adequately prepared for the responsibilities they are assigned.

Additional intermediate level technicians are needed to implement the expanded rural water supply program required to meet the goal of the National Health Plan with respect to potable water supplies. Plans to develop this type of Rural Water Technician (TAR) are currently underway, but it will be several years before a feasibility study is completed and the first trained technician is prepared to go into the field.

(d) Limited Distribution of Water Systems Based on Methodology

At present rural water supply programs in Guatemala focus on gravity-flow systems. These are more economical to build, operate and maintain than motor-pumped systems, but this constraint limits the communities to be included in the current programs. In the CARE/MOH program in El Quiché this constraint caused the elimination of approximately 100 of the 200 sites initially considered for the program.

In many regions of the country not reached by present programs, hand-dug wells with hand pumps could improve the quality and convenience of the water supply for many people.

The need factor must be balanced with economic factors when a national rural water supply plan is developed to meet the goal of the National Health Plan.

(e) Dependence on Outside Financing for Capital Costs

Dependence on outside financing, obtained in non-continuous packages, places a constraint on the development of rural water supply programs. It is difficult to move smoothly from an existing situation to a planned goal; rather, a number of often unrelated programs must be fitted together and lapses often occur between the completion of one program and the start of the next (i.e., IDB-financed projects implemented by UNEPAR.) It is impossible to maintain an adequate, well-trained staff at all levels.

Given that outside financing is necessary, replete with well-known difficulties in arranging for the financing and in meeting the

requirements and time constraints of various agencies, advanced planning is essential so that programs will fit into a continuing schedule. National Budgets must be planned so that the matching funds required by most international loans and grants are available on schedule in order to avoid expensive delays in carrying out the programs.

Community participation can make an important contribution toward the capital cost of rural water supply systems. In 1975 community contributions amounted to over 50% of the capital cost of 15 systems constructed by DSA (see page 16.) In the first CARE/MOH project in El Quiché the labor and materials contributed by the community amounted to almost 50% of the cost of the systems. Community participation contributed 17% of the cost of the 84 systems built by DDC during the past 7 years.

UNEPAR does not take advantage of the community participation potential in the systems it is building with IDB financing, although it did so under former IDB loans.

2. Projection of the Situation in 5-10 years if No New Actions are Taken

If the present philosophy continues of generally restricting the installation of water systems to communities which can be served only by gravity-fed systems, a large number of rural communities, because of their location, will not have access to an adequate potable water supply.

II.C. RECOMMENDED PROGRAMS AND ACTIONS

UNEPAR PROGRAMS

While little can be done to modify the procedures and philosophy of the IDB-financed program being carried out by UNEPAR, if modification were possible the following General Recommendations are made:

That the program be expanded to serve areas which require motor-pumped systems, even though their installation, operation and maintenance costs may be higher than for gravity-flow systems.

That greater advantage be taken of the self-help potential which exists in most rural communities through a close liaison with the sanitary inspectors, the TARs when they are trained and functioning, and the TSRs; or,

That UNEPAR decentralize much more extensively than now contemplated, including the establishment of maintenance brigades in several strategically-located areas to assume maintenance of UNEPAR-installed systems on a continuing, and when possible, preventive basis.

That at least a portion of the money collected for the use of the water services remain at the disposition of the local Water Committee to pay for operation and maintenance costs.

That training be provided for the people responsible at the village level for (a) the operation and maintenance of the village water supply system; and (b) the administration of the system, including collection of water rates and other fiscal matters.

DSA-PROGRAMS

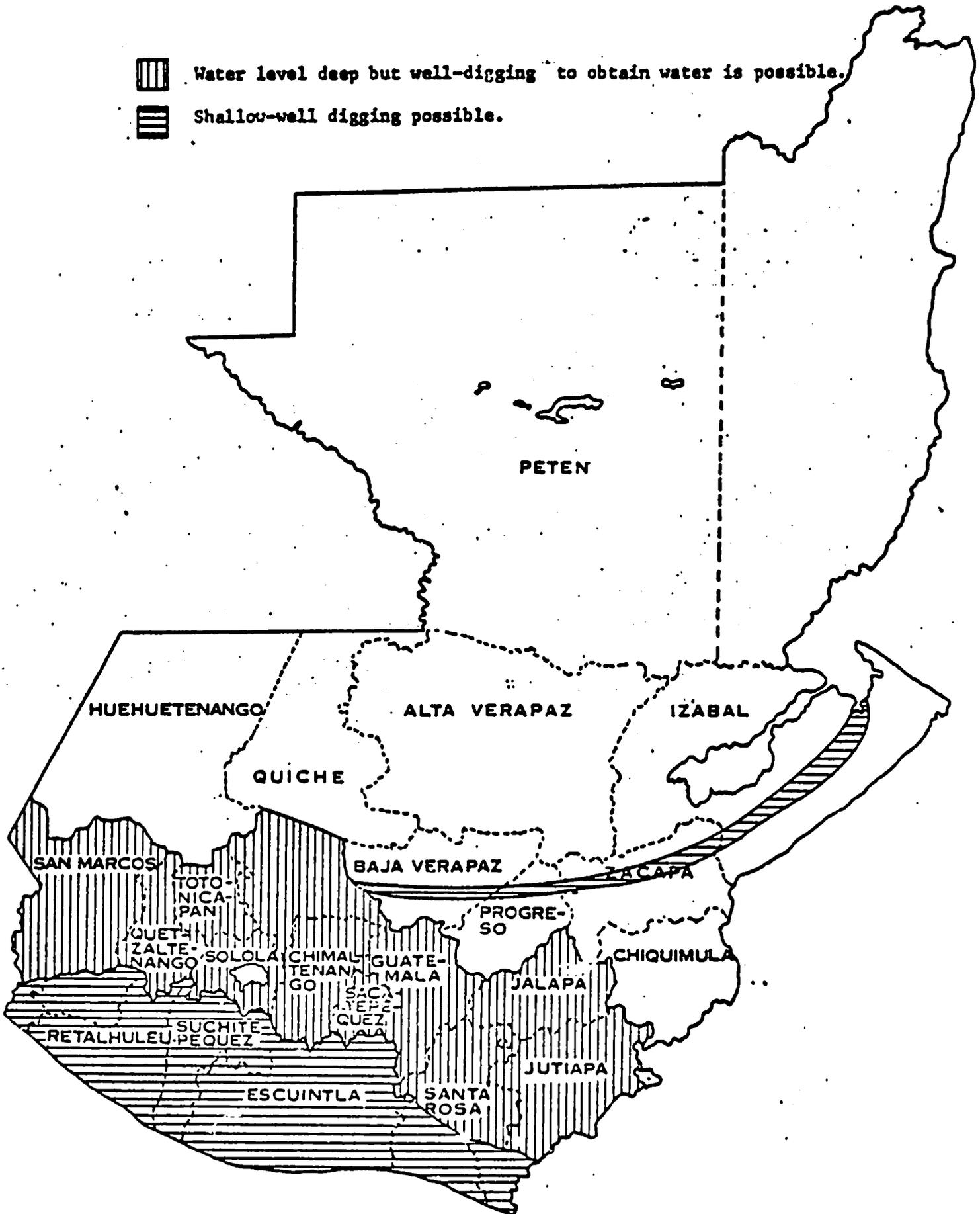
That a Shallow-Well Rural Water Development Division be set up within the DSA and a project developed which (a) provides water supply services, through the use of shallow-wells with hand pumps, to areas not reached by the programs emphasizing gravity-flow systems; (b) decentralizes and expands the activities of the DSA; (c) takes maximum advantage of the community participation potential of local areas.

The Instituto Geográfico Nacional (IGN) has identified the areas of the country where such a program is needed which might effectively solve the water supply requirements of the areas (see Map 1.) In a number of areas potable water can probably be obtained from shallow aquifers by means of hand-dug wells and hand pumps. An overlay of Map 1 onto Map 2, which shows the departments with the lowest percentage of water supply service in rural areas, and onto Map 3, which shows the departments with highest population concentration, indicates areas where shallow well programs could be most effective. The departments of Suchitepéquez, Escuintla, Retalhuleu and Chiquimula are highly indicated, with portions of other departments also indicated.

With emphasis on the installation of shallow hand-dug wells the project would provide a potable water supply for 200 small communities during a four year program. Funds would be expended primarily for the installation of shallow wells with hand pumps, with some funds used for gravity systems, shallow wells with motor-

AREAS APPROPRIATE FOR SHALLOW-WELL PROGRAMS

-  Water level deep but well-digging to obtain water is possible.
-  Shallow-well digging possible.



MAP 2

PERCENT OF RURAL POPULATION WITH POTABLE WATER, 1976

Persons Benefitted

□ 0%

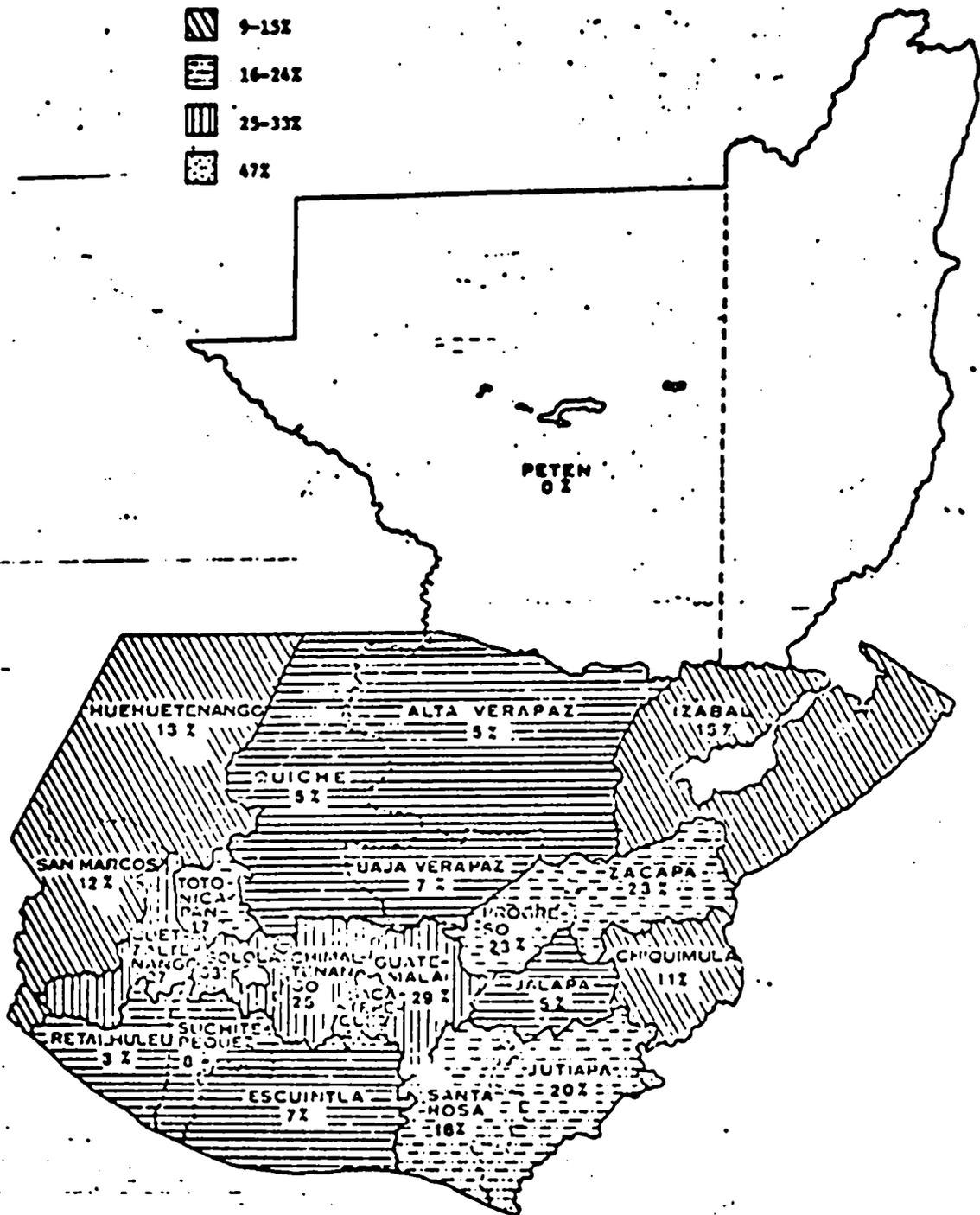
▨ 1-8%

▩ 9-15%

▧ 16-24%

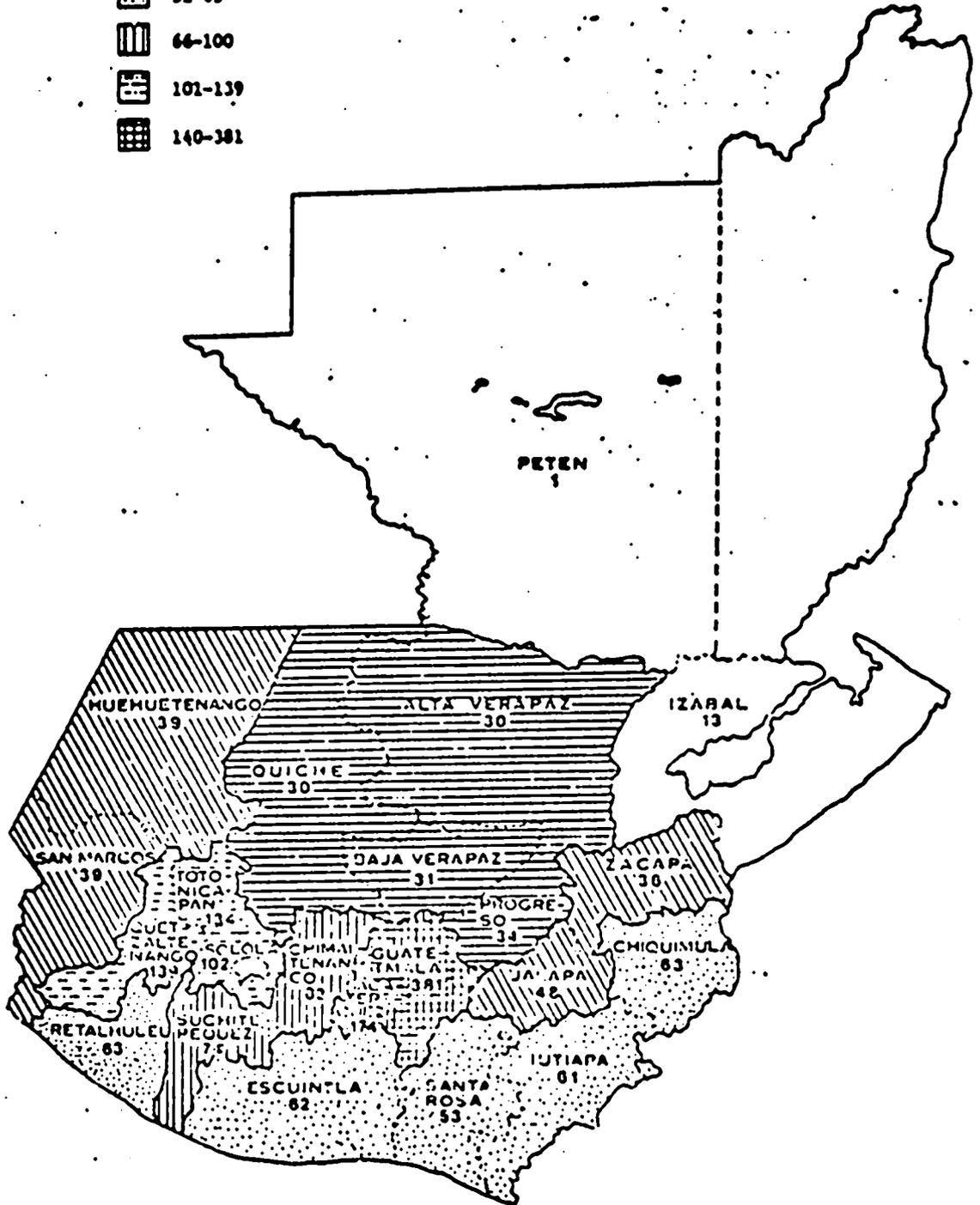
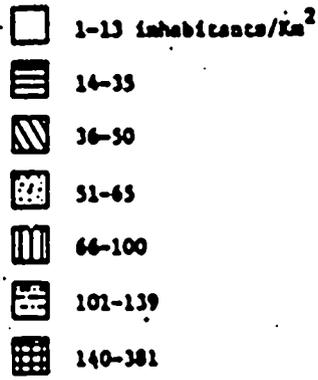
▦ 25-33%

▤ 47%



MAP 3

POPULATION DENSITY - 1973



Source: 1973 Guatemalan Census.

operated pumps, and a rudimentary distribution system with public hydrants or house connections when the user is willing to pay for the installation and monthly water rate.

Although based in the DSA, the program will be a cooperative effort between DSA, PAHO (for technical assistance) and AID. The Shallow Well Rural Water Development Division (SWD) would require as chief, a sanitary engineer or possibly a sanitary inspector supervisor with a specific interest in organizing and implementing a shallow well program. In addition to normal support staff, including supervisory personnel at the national level, a program coordinator will be responsible for three or four brigades working with the villages to dig the shallow wells, to make concrete blocks or rings which line the wells and protect them from infiltration, and to install hand pumps.

The SWD should work through the Area de Salud level, (sanitary inspector, supervisor), the Centro de Salud level (sanitary inspectors), and the Puesto de Salud level (TSRs). When trained, the TARs will be integrated into the program. Training workshops and manuals should be developed for those who will implement the program.

Well installation will depend on the agreement and cooperation of the villagers, with criteria such as maximum walking distance to the well and average number of families per well, based on specific conditions in each area. The villagers will supply local sand, gravel, and unskilled labor; the shallow well brigades will supply skilled labor for masonry and concrete work. Cement, reinforcing

steel, hand pumps, shallow well unwatering pumps, compressors and jackhammers, and transportation for the shallow wells brigades will be furnished by the project.

The estimated cost of the shallow-well program proposed is \$ 2,600,000.

That a planned program of preventive maintenance for rural water systems be established within the decentralized MOH system, using the health inspectors, the TSRs, and when they are trained, the TARs.

Under the supervision of someone with specific training in the operation and maintenance of water systems, such as the sanitary inspectors and the TSRs, and with an adequate supply of spare parts and detailed instruction manuals, the systems built by DSA and, by special arrangement, DDC, could be maintained adequately and operated efficiently.

At least one member of each local Water Committee should be trained by the TSR in the operation and maintenance of the system in his community and supervised and assisted by the sanitary inspector through the TSR. If the TSR were made a member of the Local Water Committee, a liaison would be formed between the Water Committee and the MOH.

The TSRs and the sanitary inspectors should be trained in the preventive maintenance procedures required for pumps and wells, and distribution systems as well as for gravity-flow systems. A maintenance manual for use in the field should be developed and a stock of spare parts maintained at the Centros de Salud.

The sanitary inspectors will need extensive training to fulfill their roles in the maintenance of rural water systems.

That the role of Rural Health Technician (TSR) be strengthened by the appointment of TSR Coordinators to supervise and evaluate the TSRs in the field, and by the appointment of an Advisory Council to INDAPS consisting of at least two TSR Coordinators and two Jefes de Area.

--- The lack of adequate supervision and guidance of the TSR has handicapped his effectiveness. A TSR Coordinator at the Centro de Salud level has recently been designated in El Quiché. This practice should be adopted in the other health areas with TSRs. Coordinators should be selected from among the TSRs and a comprehensive set of standards and guidelines developed for use in the supervision and evaluation of the TSR.

The Coordinator should have responsibility for periodic evaluations of the TSRs' performance, perhaps after 6 months in the field and then annually, in order to identify the ineffective TSRs and those qualified for promotion to supervisory positions.

The Advisory Council should provide feedback, based on the field experience of the TSRs, to the INDAPS training program at Quirigua. The INDAPS program will need modification, as required, to train the TSRs to meet their obligations in the field of environmental sanitation, including the training of the local Water Committees.

That the sanitary inspectors, be given extensive training so that they may adequately fulfill their role in environmental sanitation.

Estimates are that as many as 50% of the sanitary inspectors are not adequately trained for the responsibilities they are given in water supply, excreta disposal, food handling, solid waste disposal and rabies.

The MOH is giving a 9-month course to bring the sanitary inspectors up to a basic level, but only 30 to 40 per year are being trained. A method should be devised to hasten the process. If an extra 30 sanitary inspectors could be added to the staff and trained each year, they could be assigned to the Food Control Division, the Latrine Division, and to the recommended Shallow Well Division.

The corps of sanitary inspectors must be strengthened by selecting candidates who can qualify for the duties they must perform and by providing them with the necessary training.

That the feasibility be investigated of manufacturing hand pumps for use in Guatemala and for sale in other Central American Countries.

A modified AID/Battelle hand pump is being manufactured in Bangladesh as part of a three year UNICEF program which is cooperating in the yearly installation of 50,000 wells with hand pumps. The majority of the pumps are being installed in wells sunk by the hand-sluggor method which might be appropriate for use

in some areas of Guatemala where the soil is sandy or alluvium.

The Guatemala market probably would not justify the manufacture of hand pumps for use in Guatemala alone but, if a market were available in other countries, the manufacture of the pump in Guatemala guarantees that spare parts will be readily available. It would also provide another small industry and source of employment.

A part of the feasibility study should include consideration of the plastic pump being investigated by the International Development Research Centre (IDRC) of Canada.

III. EXCRETA DISPOSAL

III.A. DESCRIPTION OF THE PROBLEM

1. The Current Situation

a. Organizations Participating in Excreta Disposal Programs

Several programs foster the installation of sanitary latrines but most of the slabs and risers are produced through the DSA latrine sub-section in three plants: one in Amaticlán which has been making slabs and risers for many years, and one each in Jutiapa and Zacapa which were just recently established.

The MOH Division of Environmental Sanitation (DSA) operates an active latrine program through the sanitary inspectors assigned to the Centros de Salud and the TSRs assigned to the Puestos de Salud. The CARE/MOH program in El Quiché (Saneamiento Rural Quiché) requires that a village must have at least 80% coverage with sanitary latrines to be eligible for a water supply system. Additionally, the UNICEF/MOH/PAHO post-earthquake rehabilitation program includes a latrine installation element.

The Dirección de Desarrollo de la Comunidad (DDC), a dependency of the Presidency of the Republic of Guatemala has included for many years the installation of sanitary latrines as part of its environmental sanitation program. This effort is being expanded currently through a special arrangement with DSA for providing an increased number of slabs and risers; the DDC staff in the field will give more emphasis to the importance of the installation of the latrines.

b. Population with Sanitary Excreta Disposal Facilities

There is practically no information available on the number of rural people who have and use sanitary latrines, but estimates can be made on the basis of the slabs and risers produced and distributed.

A total of 54,500 slabs and risers were produced and distributed between 1959 and 1969. Another 80,500 were produced between 1970 and 1976 of which 60,541 were distributed. It is assumed that an average of 2,000 latrines per year was distributed by the Cooperative Health Service Latrine Program between 1944 and 1958. Using the average family size as 5.3 persons, it is estimated that by 1976 about 770,000 persons were served by sanitary latrines.

The latrine data is not broken down by rural and urban populations served. However, assuming that the distribution of latrines is uniform in urban and rural areas, about 500,000 people or 13% of the rural population were provided with sanitary latrines by 1976.

c. Progress During the Past Five Years

The distribution of latrines by departments from 1970 through 1976 is tabulated in Table 9. The production and distribution of latrines for 1959 through 1976 is shown graphically in Figure 9. It is evident that distribution, and presumably demand, has lagged behind production since 1971.

TABLE 9
THE NATIONAL LATRINIZATION PROGRAM
INSTALLATION PHASE FROM 1970 TO 1976

DEPARTMENT	1970	1971	1972	1973	1974	1975	1976	TOTALS
1. Guatemala	388	823	750	863	0	868	2,134	5,826
2. Izabal	614	619	540	353	0	96	706	2,928
3. Chiquimula	483	419	320	139	0	192	661	2,214
4. Chimaltenango	460	501	462	418	100	428	794	3,163
5. Jalapa	326	379	224	9	0	69	518	1,525
6. Jutiapa	244	307	319	214	0	132	513	1,729
7. Baja Verapaz	346	359	282	27	0	178	680	1,872
8. Alta Verapaz	435	417	420	94	0	196	679	2,241
9. El Progreso	201	359	380	121	0	303	1,309	2,673
10. Zacapa	569	469	450	206	0	238	1,756	3,688
11. Suchitepéquez	344	450	394	92	0	333	383	1,996
12. Sacatepéquez	262	319	280	7,551	1,730	147	989	11,278
13. El Quiché	-	281	220	0	0	337	724	1,562
14. Sololá	201	359	141	34	100	58	483	1,376
15. Totonicapán	159	279	210	37	0	492	716	1,893
16. Huehuetenango	207	464	320	6	70	199	513	1,713
17. Petén	184	319	372	0	0	140	503	1,518
18. Retalhuleu	266	429	389	5	0	150	380	1,625
19. Quetzaltenango	285	428	412	300	0	648	537	2,610
20. San Marcos	278	414	342	9	100	295	1,453	2,891
21. Escuintla	508	577	592	314	0	134	477	2,602
22. Santa Rosa	250	379	314	0	60	67	586	1,618
TOTALS	6,913	9,350	8,132	10,786	2,160	5,700	17,500	60,541

5.14-54

SOURCE: Dirección General de Servicios de Salud
División de Saneamiento Ambiental

FIGURE 9

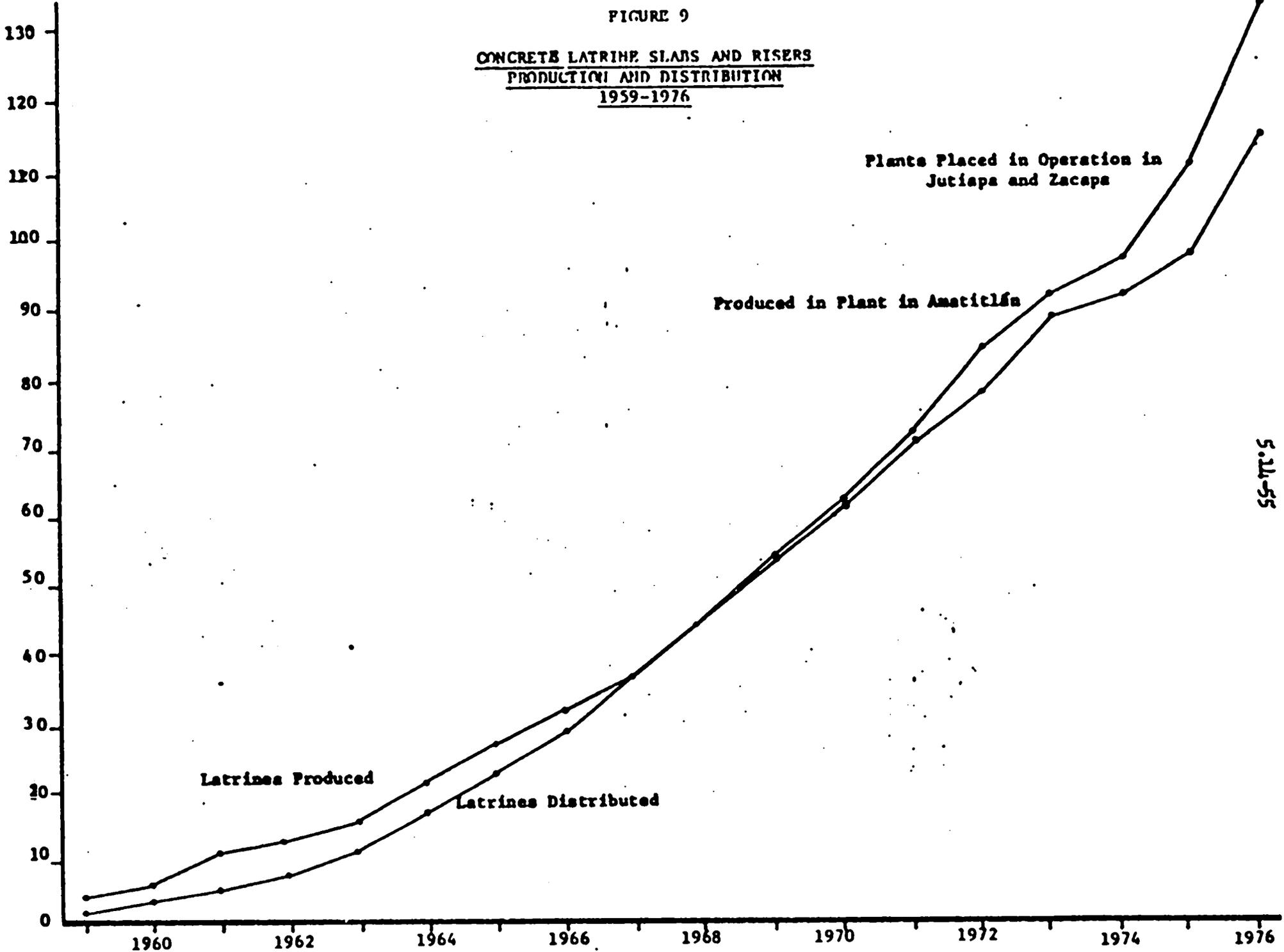
CONCRETE LATRINE SLABS AND RISERS
PRODUCTION AND DISTRIBUTION
1959-1976

Plants Placed in Operation in
Jutiapa and Zacapa

Produced in Plant in Amaticlán

Latrines Produced

Latrines Distributed



5.11.55

In 1973 a pilot project entitled "Plan Piloto de Construcción, Distribución e Instalación de Latrinas para el Año 1973"⁽¹⁾ was developed within the Department of General Sanitation of the DSA to distribute and install 12,000 latrines, 6,000 in the Department of Sacatepéquez and the remainder to be installed 1,000 each in the health regions in use at that time. Of 6355 latrines delivered to the Department of Sacatepéquez, 96% were installed by January 1975. At the time of evaluation less than 15% were not being used and only 8% were dirty. This indicates the effectiveness of the educational campaign before, during and after latrine installation, as well as the advantage of concentrating the program in a well-defined area for a definite period of time.

2. Quality and Availability of Information

The information on latrines installed in rural areas is meager and based mostly on estimates. The best information is provided by the three plants which manufacture latrine slabs, risers and covers but this provides only the numbers of latrines produced each year. (See Table 10: Production and Distribution of Latrines, 1959-1969 and Table 11: The National Latrination Program, Production Phase 1970-1976.)

(1)

The project results are reported in a thesis entitled: "Importancia del Trabajo Social Profesional en los Programas de Saneamiento Ambiental", July 1975, prepared by María Reginalda Gil Hernández and presented to the School of Social Service of the University of San Carlos, Guatemala.

TABLE 10

PRODUCTION AND DISTRIBUTION OF LATRINES, 1959 TO 1969

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	TOTALS
LATRINE PRODUCTION	3,850	3,000	3,500	2,800	3,600	5,000	5,500	5,000	5,300	8,000	9,000	54,550
LATRINE DISTRIBUTION	2,475	2,172	1,802	2,063	3,309	5,693	5,685	6,349	8,583	8,069	8,290	54,490

SOURCE: Dirección General de Servicios de Salud
División de Saneamiento Ambiental

TABLE 11

THE NATIONAL LATRINIZATION PROGRAM
PRODUCTION PHASE FROM 1970 TO 1976

PRODUCTION PLANTS	1970	1971	1972	1973	1974	1975	1976	TOTALS
1. Amatitlán	8,000	10,000	12,000	8,000	5,000	14,000	19,500	76,500
2. Jutiapa	-	-	-	-	-	-	1,500	1,500
3. Zacapa	-	-	-	-	-	-	2,500	2,500
TOTALS	8,000	10,000	12,000	8,000	5,000	14,000	23,500	80,500

SOURCE: Dirección General de Servicios de Salud
División de Saneamiento Ambiental

An evaluation is needed of the number and distribution of people lacking sanitary excreta disposal facilities before a plan is developed to meet the sanitary excreta disposal goal of the National Health Plan, 1975-1979.

3. Comparison of The Situation with COG Plan Objectives

The goal of the National Health Plan is that 50% of the rural population will be served by some means of sanitary excreta disposal (sanitary latrines). To meet this goal, means that 2.17 million people will have such services within the next five years. It is estimated that 500,000 people living in rural areas had latrines in 1976, therefore services are needed for an additional 1.66 million people. This will require 313,200 latrines, an average of 63,000 per year, more than 4 times the present production destined for use in rural areas.

UNICEF has estimated that the present plants could produce 36,000 latrines per year (20,000 in Amatitlán, and 8,000 each in Jutiapa and Zacapa). Of these 23,400 would be for use in rural areas, leaving an annual shortage of 39,600. Production of these will require five additional plants the size of Jutiapa, and a slight increase in production in Amatitlán, assuming all additional production would be for use in rural areas.

III.B. Analysis of the Problem/Situation

1. Causes of the Problem

a. Lack of Planning

Several agencies are running isolated programs, all dependent on the production of the latrine slabs and risers by the three DSA plants but without consideration of the production capacity of the plants. UNICEF is planning on installing 15,000 latrines from April through December 1977. Based on 1976 figures the regular on-going latrine programs of the DSA will require about 8,000 latrines. DDC has a program proposing the installation of 30,000 in a year; it can be assumed that half of these latrines will be installed or at least need to be manufactured during the remainder of 1977. The potential demand for latrines by these three groups during a one-year period would be 30,000 latrines. Production of the three plants reached 23,500 in 1976.

These estimates are based on present institutional program demands without considering the actual requirements to meet the goal of the National Plan for Health, but they emphasize the need for the development of a long term national plan for the manufacture, distribution and installation of sanitary latrines.

b. Inadequate Management of Production and Distribution

The existing organization is inadequate to administer and operate efficiently the present latrine production and distribution program. Production in the Amatitlán plant is well managed and the product well made. The Zacapa plant was not visited but is reported

to be well run. However, in the Jutiapa plant the slabs and risers are poorly made, the percent of breakage is very high, and lack of supervision is evident

c. Inadequate Funding of Production and Distribution

It is reported that funds allocated for the construction of latrines have been diverted to other programs in the past. Regular and efficient production cannot be maintained when cement, sand, reinforcing steel and wood for the latrine tops are not available when needed.

In the Sacatapéquez demonstration, 1973-1975; (see page 56) a 50-cent charge was made for each latrine and the slabs, risers and tops were transported by the DSA. At present the latrine, slabs, risers and tops are being furnished the householders without charge and the agency using the latrines is responsible for their transportation from the three plants. For DSA programs the municipalities involved provide the transportation.

Any diversion of funds or difficulty in financing transportation undoubtedly slows the distribution and installation of sanitary latrines.

2. Interrelationship with Other Elements of the Health Sector

The latrine programs are intimately connected with other elements of the health sector since every latrine installed helps destroy the chain of infection caused by the insanitary disposition of human excreta. The production of latrine slabs and risers by the DSA for installation by non-MOH agencies is fully justified for such programs aid the MOH in its efforts to improve the environmental sanitation of the country.

III.C. RECOMMENDED PROGRAMS

To meet the National Health Plan goal of providing 50% of the rural population with sanitary excreta disposal facilities within 5 years will require 5 additional plants for the manufacture and distribution of latrine slabs and risers, and an increase in the production of the existing plants to the estimated capacity suggested by UNICEF. This will place an unbearable strain on the DSA latrine program.

Therefore the following recommendations are made with respect to a national program for the installation of latrines:

1. That the National Health Plan goal for sanitary excreta disposal facilities be amended to provide 40% of the rural population with sanitary excreta disposal facilities by 1981.

2. That the capacity of the División Saneamiento Ambiental to produce, distribute and coordinate the installation of latrine slabs, risers and covers be strengthened and incorporated into a comprehensive latrinization program to meet the revised goal of the National Health Plan as recommended above.

This will require that :

a) A determination be made of the need for and suggested distribution of latrines throughout the country.

b) Three new plants the size of Jutiapa be constructed in locations determined by distribution of need, satisfactory location of sand and gravel, and proximity to good roads, using the experiences

of the Amatitlán plant as a base for constructing and equipping the new plants.

Plants strategically located for distribution and transportation factors, will cut costs considerably. Rather than transporting concrete slabs and risers to remote areas, it will be necessary to transport only cement and reinforcing steel to the new plants. The sand and gravel, which contribute the major weight of the latrines will be obtained locally. Additionally, the plants will provide employment in three different areas of the country.

c) A latrine program coordinator be designated within the DSA and a supervisor, managers and workers for the plants be selected. The person in charge of the latrine program within DSA must be responsible for coordinating the activities of the several agencies with latrine programs based on a schedule of needs and the production capacity of the latrine plants. A full time supervisor will visit each plant twice a month to ensure that quality control is maintained and that the flow of materials to the plants is kept on schedule.

d) Standards, operating procedures and job descriptions be developed for the coordinator, supervisor and plant managers.

e) Additional staff/workers be trained and the existing staff/workers participate in a refresher training course. The Amatitlán plant should be used to provide refresher training for the personnel at the Jutiapa plant and possibly at the Zacapa plant, and should be the training school for new personnel.

f) A continuing health education program be implemented within the MOH, under the direction of a trained health educator, which utilizes the efforts of all health personnel, especially the sanitary inspectors and the TSRs.

This program should incorporate the findings described in Annex 17; Environmental Sanitation: A Survey of Attitudes and Practices, May 1977, and should convince the villagers that latrines are essential for their well-being. The villagers should be helped to install the latrines, to use them properly and to keep them clean.

g) The plants be assisted in operating for two years for training purposes and to develop efficient administrative operational procedures.

h) The experience gained in the Sacatapéquez Project, 1973-1975 (see page 56) be used as applicable.

The estimated costs for this program which would set-up three latrine factories each with a capacity to produce 8,000 latrines a year for 4 years is as follows:

Construction and Installation Costs

Building	5,000	
Equipment and Machinery	8,300	
Truck	12,000	
Tools	300	
Miscellaneous	<u>4,400</u>	
	30,000	
For 3 factories	<u>x 3</u>	
	90,000	
Inflation factor	<u>9,000</u>	
Sub-Total, Construction and Installation		99,000

Production Costs

Materials	40,800	
Labor	<u>20,700</u>	
	61,500	
for 4 years	<u>x 4</u>	
	246,000	
Inflation factor	<u>24,000</u>	
Sub-total, Production Costs		270,000

Other

Supervisor/Coordinator	12,000	
for 4 years	<u>x 4</u>	
	48,000	
Inflation factor	<u>5,000</u>	
Sub-total, Other Costs		53,000

Training Costs		<u>10,000</u>
TOTAL FOR PROGRAM		<u>\$ 432,000</u>

3. That concurrently with the above program, the acceptability be investigated of a squat-type latrine with a water seal siphon for hand flushing, similar to the type being used in the Far East.

It is suggested that the possibility be investigated of using a plastic siphon such as those made in New Zealand as an alternative to the concrete siphons used in programs such as the UNICEF program in Bangladesh.

Dr. Arnoldo Daniel Faronda S., Jefe de Medicina Sanitaria of DDC, has expressed an interest in this type of investigation. Joint research between his program, AID and the International Development Research Centre (IDRC) should be considered.

If the strong preference is for a riser instead of a squat type latrine, at least two possibilities should be considered:

(a) The local manufacture of a plastic riser, to replace the present concrete riser, taking advantage of the smooth, non-porous surface of plastic and perhaps making the riser in different colors. The use of a water seal siphon should be considered.

(b) The use of a vitrified riser such as is being used in Colombia which is provided with a siphon for hand flushing.

IV. SOLID WASTE MANAGEMENT

IV. A. Introduction

Solid waste can be defined as "a discarded, putrescible or nonputrescible solid material, excluding body discharges, which may include paper, cardboard, metal, plant trimmings, glass, mattresses, food wastes, animal, plant or vegetable wastes, ashes, incinerator wastes, street sweepings, and other wastes proceeding from market and industrial origins." Solid waste management techniques attempt to optimize the storage, collection, transportation and ultimate disposition of solid wastes.

Poor management of solid wastes can result in conditions which are hazardous to human health and safety. Garbage heaps can become homes for rodents, roaches, flies, mosquitoes, and other vectors capable of transmitting diseases. Accidents in dumps involving cuts and burns affect children playing in the area and others who may be scavenging or pursuing other activities.

Smoke from burning dumps aggravates respiratory ailments and allergies. In addition to direct health problems, improper disposal of solid wastes can cause water and air pollution, as well as sight and odor problems.

The ill effects of poor solid waste management increase with population concentration. Thus, while attention to the rural solid waste problem is required, it is urgent that solutions be found for the cities.

IV. B. Description of the Situation

The solid waste problem in Guatemala affects three areas:

- (1) Guatemala City, (2) intermediate cities and (3) small villages and rural areas.

1. Guatemala City

Solid waste management in Guatemala City has been thoroughly studied by Black & Veatch International Consulting Engineers⁽¹⁾ who pointed out a number of problem areas.

Responsibility for solid waste in Guatemala City is vested in the municipal División de Limpieza Pública which sweeps the streets, removes waste from the public markets, and operates the disposal site. Service is not provided uniformly; parts of Guatemala City are served free of charge by municipal vehicles while the remainder is served by private collectors at an average monthly charge of \$ 1.50. Collection is generally three times per week, but varies from collector to collector. There is virtually no data concerning the volume and nature of the solid wastes generated, and there is no control of storage facilities. The disposal site is suitable but not operated correctly; wastes are dumped in various parts of the landfill, there are uncontrolled fires, and about 200 scavengers, whose health and safety is in constant danger, eke out a living from the waste.

2. Intermediate Cities

Although the intermediate cities have problems similar to those of Guatemala City, resources are scarcer and there is less concern about the problem.

The municipality usually collects street sweepings and waste generated by the public markets and public institutions, using generally insufficient equipment; domestic wastes are more commonly collected by private collectors

(1) Black & Veatch International Consulting Engineers, Estudio del Plan de Recolección y Tratamiento Final de Desechos Sólidos. Guatemala January 1976.

whose routes often crisscross, resulting in much wasted effort. The disposal site, usually managed by the municipality, is the nearest river or low spot. Industries, required to dispose of their own wastes, deposit them at the most convenient place. One finds unofficial dumps all over the cities where garbage is burned with little if any control, causing air pollution and creating obnoxious odors and unsightly messes.

3. Small Villages and Rural Areas

There appears to be a smaller per capita generation of wastes in the small villages and rural areas which makes the problem less severe. Nevertheless, people take what wastes they have to convenient places to burn them, or dump them into rivers and streams used for domestic purposes.

IV. C. The Situation in 5-10 Years, If No Action Is Taken

In the next few years the problems caused by solid waste will increase. With the population increasing annually at a rate of 3.1% and with per capita generation of solid waste increasing as the country develops, the total daily volume of wastes can be expected to double within the next ten years. If attention is not given to the problem, its detrimental effects will increase exponentially.

IV. D. Organizations Responsible for Solid Waste Management

Responsibility for solid waste management in Guatemala is shared by the Environmental Health Division of the Ministry of Public Health and Social Assistance (EHD/MOH) and the individual Municipalities. Article 186 of the "Código de Sanidad de la República" (Sanitary Code) places on the EHD/MOH the responsibility of regulating the sanitary aspects of the

management of solid waste. The Municipalities are responsible for organizing the collection and disposal of solid wastes under Article 96, which also states that the Municipality must obtain approval of its procedures from the EHD/MOH. A revised sanitary code, known as the "Código de Salud", currently in draft, will replace the "Código de Sanidad de la República", and will assign responsibility more directly to the EHD/MOH of the proposed revised code. It states that "The Municipalities will abide by the standards established by the EHD/MOH in all matters relating to the organization given to the provisions of cleaning (public areas and) collecting, treating, and disposing of garbage and solid wastes." The new code is expected to go into effect in the near future.

IV. E. Comparison of the Situation with GOG Objectives

One goal of the Plan Nacional de Salud for 1975-1979 is the provision of "Adequate systems for the collection, transportation, processing and final disposition of solid waste in at least 70% of cities with 20,000 or more inhabitants by the end of the decade. Currently this includes the cities of Guatemala, Quetzaltenango, Escuintla, Puerto Barrios, Mazatenango, and Retalhuleu. Cities expected to meet the population criterion by 1979 are Amatitlán, Chiquimula, Coatepeque, Antigua, Mixco, and Santa Lucía Cotzumalguapa.

In spite of the interest given to the problem of solid waste on the part of MOH authorities in Guatemala City, casual observation indicates it is not a major concern of sanitary inspectors in the field; perhaps

this reflects their frustration in dealing with the municipalities, who generally appear to give solid waste a very low priority. Municipal authorities complain of insufficient funds, lack of interest on the part of councilmen, and strong feelings against charging the public for solid waste service.

IV. F. Proposed Actions

The suggestions contained in the study of attitudes and practices should be taken into consideration in connection with any approach to the solid waste management problem.

1. Guatemala City

The Black & Veatch study presents a series of recommendations which are summarized as follows:

- (a) That clear municipal rules and regulations be established for the storage, collection, and disposal of solid wastes, with approval of the EHS/MOH.
- (b) That a short and long term plan be established for solid waste activities.
- (c) That the present dump be operated as an actual sanitary landfill.
- (d) That an additional "airport tax" on tourists be imposed to generate income for the operation of the solid waste system. (An alternative not proposed in the Black & Veatch report is to add an amount for solid waste collection to the water bill).
- (e) That certain administrative changes be established within the "División de Limpieza" to streamline its activities.

- (f) That metal bulk containers be placed in strategic places throughout the city.
- (g) That rules be established concerning storage of solid waste at homes which will apply immediately to all new construction.
- (h) That all hospitals be required to incinerate their wastes on site.
- (i) That new equipment be purchased.
- (j) That scavenging of materials at the landfill site be regulated.

2. Intermediate Cities

Solutions to the solid waste disposal problems of the intermediate cities need adaptation to the specific resources and conditions of each city. General Recommendations can be made, however:

- (a) That a formal program be established whereby all intermediate cities are surveyed by the local sanitary inspector in coordination with the municipality.

The inspector would have to be persuaded that his job is one of educating the municipal authorities in the need for more suitable and sanitary systems of solid waste management.

An excellent EHD/MDH survey form and guidelines for the establishment of adequate solid waste collection and disposal systems in the intermediate cities is attached as Form 1.

- (b) That the system established at Amatitlán be studied as a model.
This system is subject to improvement but it is oriented in the right direction, at minimum expense.

3. Small Villages and Rural Areas

Solid waste disposal in small villages and rural areas will need to be organized on a community basis.

General recommendations for the improvement of solid waste practices in small villages and rural areas, are:

- (a) That one key person in the community who can provide continuity to the program should be identified before any program is attempted.

This person can be a sanitary inspector from the EHD/MOH, or the TSR. His primary job will be to educate the community in the value of handling solid wastes in a sanitary manner and to keep the system from degenerating once it is established.

- (b) That community systems involving either human or animal drawn carts be considered.

Mechanical equipment should be avoided. Involvement of the community in construction of the cart, provision of the animal, and design of the community system will insure its success.

- (c) That disposal be accomplished in as simple a manner as possible.

A trash pit located at least 100 meters from the nearest house, where wastes are burned daily under someone's control, and then covered with dirt at the end of each day is a suitable solution. Ingenious "ecological" techniques such as composting of waste to obtain fertilizers, attempting to recover materials from the waste, or attempting to recover methane through anaerobic digestion, should be avoided. These schemes generally turn out to be more sophisticated and difficult than originally envisioned and should be attempted

only if someone experienced can be continuously available to the community.

- (d) That private collectors already in business be incorporated into any new scheme.
- (e) That the community contribute to the operation of the system either monetarily, or by providing the necessary labor.
- (f) That the corps of sanitary inspectors and the TSRs be strengthened and appropriately trained to assist in carrying out the solid waste management recommendations.

Form Used by MOH for Solid Waste Surveys

HEALTH SERVICES OFFICE
ENVIRONMENTAL SANITATION DIVISION
 Guatemala, C. A.

DATA SHEET FOR GARBAGE COLLECTION AND DISPOSAL SURVEY

I. INFORMATION

Health Center _____ Health area _____
 Municipality _____ Departamento _____
 Inspector's name _____ Date _____

II. GENERAL ASPECTS OF THE INVESTIGATION

1. Name of town under study _____
2. Town population _____
3. Number of buildings _____
 - a. Homes _____
 - b. Commercial buildings _____
 - c. Industrial buildings _____
 - d. Institutional buildings _____
(hospitals, schools, etc.)
4. Average garbage production per day in m³ according to sampling

	<u>Unit:</u>	<u>Total:</u>
a. Habitational _____		
b. Commercial _____		
c. Industrial _____		
d. Institutional _____		
5. Garbage Deposits

	<u>Volume</u>	<u>Number</u>
a. Domiciles _____		
b. Public _____		
6. Collection

	<u>Home</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Institutional</u>
a. Home _____				
b. Sidewalk _____				
c. Street corner _____				
d. None _____				
7. Transportation

	<u>Home</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Institutional</u>
a. Hauled by trucks _____				
b. Hauled by animals _____				
c. Hauled by men _____				
8. Final disposal (at present)

	<u>Number</u>	<u>Volume</u>	<u>Sanitary</u>	<u>Unsanitary</u>
			No. Vol.	No. Vol.
a. Number of dumps				
Authorized _____				
Unauthorized _____				

9. Cost of present service Home Commercial Industrial Institutional
- a. Inside building _____
- b. Outside building _____
10. Frequency of service _____
11. Estimate in m³ (to determine vehicle capacity) _____
12. Type of vehicle _____
13. Routes (in accordance with sanitary plan)
- a. Number of pick-up places _____
- Days assigned to each route (1-2-3-4-5-6-7)
- Monday _____
- Tuesday _____
- Wednesday _____
- Thursday _____
- Friday _____
- Saturday _____
- b. Route for final disposal (distance) _____
14. Equipment
- Vehicle (capacity) _____
- Shovels _____
- Pitchforks _____
- Workclothes _____
- Gloves _____
- Facemasks _____
- Helmets _____
- Other _____
15. Final Disposal
- a. Ravine _____
- b. Sanitary fill _____
- c. Trenches _____
- d. Other _____
- Predominant wind direction _____
16. Costs
- a. Vehicles _____
- b. Equipment _____
- c. Labor _____
- d. Other _____
- TOTAL _____
17. Financing Weekly Biweekly Monthly TOTAL
- a. Home service charges _____
- b. Commercial service charges _____
- c. Industrial service charges _____
- d. Institutional service charges _____
- TOTAL _____

Work presented by Sanitation Supervisors: Prof. Carlos René De León G.
and Prof. Flavio Valle Julián.

V. COMMUNITY MARKET SANITATION

The markets, slaughterhouses and other public places where food is handled are notorious as epicenters for the spread of diseases as a result of their unsanitary conditions.

A sanitary inspection and enforcement function exists within the Food Control Division of the Division of Sanitary Environment of the MOH, but its staff is limited and its area of action is confined almost exclusively to metropolises in Guatemala City.

The limited control carried out in nearby cities does not extend to the rural areas. The sanitary inspector, responsible for these areas often is not prepared to carry out food control measures.

RECOMMENDATION:

That the sanitary conditions under which food is handled be improved through education of the sanitary inspectors and subsequently of the food handlers.

A short 3-day training course supplemented with a manual, should be developed and given by members of the Food Control Division in places where the sanitary inspectors and supervisors from nearby departments can be gathered together. PAHO may be interested in assisting with both the manual development and the course preparation and presentation.

VI. CONTROL OF RABIES

VI.A. DESCRIPTION OF THE CURRENT SITUATION

1. Definition of Its Nature, Magnitude and Distribution

Rabies has been present in Guatemala since the 17th century but the importance of its control was not determined until 1955 when anti-rabies campaigns were initiated by the MOH through the Department of Veterinary Hygiene, Zoonosis and Food Control of the Dirección General de Salud Pública (now the Dirección General de Servicios de Salud).

Table 12 - The Known Cases of Rabies in Humans and Table 13 - Cases of Canine Rabies, present data for the period 1963-1972, which indicate that for both the human and canine populations the potential risk is great of being infected with rabies and suffering subsequent death or a painful treatment procedure. A danger also exists of post-vaccination reactions due to defects in the elaboration of the vaccine.

The control of rabies is delegated within the MOH to the Division of Epidemiology through the Department of Zoonosis, whose annual \$15,500 budget supports a Veterinarian, nine assistants, administrative offices, one 36-cage kennel, a cremating oven, and a necropsy room for disposal of captured street dogs without owners and for observation of dogs suspected of having rabies. MOH guidelines exist, entitled "Regulation for the Control and Eradication of Rabies" but these were written 20 years ago and need to be updated for present-day conditions.

TABLE 12

KNOWN RABIES CASES, PERSONS BITTEN, AND PERSONS TREATED
Guatemala 1963 - 1972

	Human Population	Rabies Cases		Persons Bitten		Persons Treated	
		No.	Rates per 100,000	No.	Rates per 10,000	No.	Per cent ⁽¹⁾
1963	4,207,706	2	0.04	4,394	10.4	384	8.7
1964	4,331,447	7	0.16	4,520	10.4	255	5.6
1965	4,464,595	6	0.13	4,454	10.0	3,560	79.9
1966	4,560,993	2	0.04	3,922	8.6	1,617	41.2
1967	4,727,935	1	0.02	9,680	20.5	3,313	34.2
1968	4,875,635	3	0.06	4,494	9.2	1,442	32.1
1969	5,031,928	2	0.04	4,147	8.2	1,343	32.4
1970	5,382,761	1	0.02	5,067	9.4	1,200	23.7
1971	5,553,050	-	-	4,135	7.4	1,459	35.3
1972	5,723,239	3	0.05	5,202	9.1	2,249	43.2
TOTAL		27	-----	45,511	-----	15,432	-----

(1) Based on percentage of persons bitten who are receiving treatment.
Source: Zoonosis Department, Ministry of Public Health and Social Assistance (MOH).

TABLE 13

CASES OF CANINE RABIES
Guatemala 1963 - 1972

Year	Canine Population Estimated (1)	No. of Cases	Rates per 10,000
1963	420,770	184	4.3
1964	443,144	252	5.8
1965	446,459	182	3.9
1966	460,099	183	4.0
1967	472,793	192	4.0
1968	487,563	102	2.0
1969	503,192	110	2.1
1970	538,276	215	4.0
1971	553,305	141	2.5
1972	572,324	182	3.1

(1) Estimate based on 1 dog per each 10 inhabitants.
Source: Zoonosis Department, Ministry of Public Health and Social Assistance (MOH).

Two complete rabies-diagnosis laboratories exist in Guatemala. One is at the San Carlos University. The other, located at the Biological Institute of the Central Laboratory, is operated by Dirección General de Servicios de Salud, within the MOH. This laboratory, staffed with a Veterinarian and a Laboratory Technician, both trained at the Zoonosis Panamerican Center (CEPANZO), has two microscopes for immunofluorescence and a binocular for histological tests, and is capable of performing Sellers-type tests, immunofluorescence and mouse inoculation.

The vaccine used in humans is Semple type, with a concentration of 1.5% of inactivated nervous tissue, and is produced in rabbits. A second vaccine, type CRL is produced in small scale for both human and animal use. For animal use only, the anti-rabies avianized vaccine (produced in birds) is made, type Flurry modified of high and low passage (LEP and HEP). These vaccines are reliable and are controlled under the recommendations of the National Institute of Health, USA, and CEPANZO, where sample lots are sent periodically for verification.

Rabies, prevalent throughout the country, is predominant in May, August and December. Rabies has been found in canines, bovines, wild animals and bats, although the tests made in bats have given negative results.

2. Quality and Availability of Information

Information on rabies is incomplete, not up-to-date, and found in several sub-registries which cause its magnitude and its significance

as a serious health problem for humans and animals to be underestimated.

This may be the reason why the National Health Plan does not include among its objectives, goals, priorities, or specific activities, any steps designed for the control and eradication of rabies.

VI.B ANALYSIS OF THE PROBLEM SITUATION

1. Causes

A large canine population, estimated at 650 thousand dogs, nationally, or one dog per each ten persons, roams the streets and market places without control. This, added to the lack of a permanent, frequent and well organized anti-rabies vaccination program, makes rabies endemic in all populated areas of the country, with seasonal outbreaks and epizootic outbreaks every two years.

2. Interrelations with Other Health Sector Elements

There is no direct interrelationship with other Health Sector elements with respect to the control of rabies. However, communication between the Ministries of Health and Agriculture through their appropriate Divisions must be consistent and frequent. Information from both must complement each other for appropriate analysis and effective use.

3. Projection of the Situation If New Steps Are Not Taken

If new adequate measures are not taken, such as an intensive national program for the control and eradication of rabies, the problem can be expected to increase in humans as well as in animals.

VI.C. PROPOSED PROGRAM

The most advisable method for the control of rabies is the reduction of the susceptible canine population, through an immunization program using a reliable vaccine which will (a) immunize a minimum of 80% of the susceptible canine population within a year and (b) be continued on a scheduled basis in order to eradicate the virus in the canine population. Isolated cases should be treated as epidemiological, eliminating the source and the contacts.

The anti-rabies vaccination program should begin in the capital city, the area with the highest concentration of human and canine population, and then extend to the rest of the country.

Education of the human population about the care, protection and health of the dog is necessary to ensure an anti-rabies, and not an "anti-dog", campaign.

A counterpart to the canine immunization program is a program which considers the most effective treatment of persons exposed to the infection, including the post-vaccination risks.

Each possible contact with rabies must be evaluated individually and treated accordingly. The three vaccines used are reliable and include duck embryo vaccine (DEV), anti-rabies human immunoglobuline (RIG) and the anti-rabies echinus serum (ARS).

Estimated Costs of the Proposed Program

The implementation of this program will cost approximately \$75,000 annually.

VI.D. CONCLUSION

Because of the high canine population and the lack of a well-consolidated, efficient and regularly scheduled anti-rabies vaccination program, rabies is to be considered a serious health problem for humans as well as for animals.

VI.E. RECOMMENDATIONS

1. That an intensive anti-rabies canine vaccination program be planned and implemented which immunizes 80% of the canine population in one year and continues on a scheduled basis until the disease is controlled.

To carry out an effective program all community resources in rural areas, as well as private sector and governmental resources, must be maximally used and communication, cooperation and collaboration between the respective divisions of the Ministries of Health and Agriculture will be essential. All rabies-control activities must be based on scientific standards and precise procedures supported by appropriate regulations. The appropriate official sectors must be fully informed of these activities as well as the communities in which they are to occur.

2. That data collection and analysis systems be revised to provide reliable, up-to-date information which facilitates program development and analyses.

3. That rabies, as a disease entity with high potential risk, be studied in depth in order to determine and maintain the appropriate control standards.