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# The Bank's Participation in Rural Water Supply Programs in Latin America and the Caribbean

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September 1982

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# **The Bank's Participation in Rural Water Supply Programs in Latin America and the Caribbean**

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September 1982

This report, prepared by Juan Alfaro, Chief of the Sanitary Engineering Section of the Project Analysis Department of the Inter-American Development Bank, was presented at the IV World Water Resources Congress held in Buenos Aires, Argentina, in September 1982.

One of the IDB-financed programs carried out by the Instituto de Acueductos y Alcantarillados Nacionales, of Panama, was aimed to provide services to some 60 rural communities and expand the existing systems in another 20 towns, benefiting a population of 120,000.



TABLE OF CONTENTS

	<u>Page</u>
I. Introduction . . . . .	1
II. Evaluation Methodology . . . . .	5
III. Results . . . . .	6
A. Technical Aspects . . . . .	6
1. Design Criteria . . . . .	6
2. Service Levels . . . . .	6
3. Operation and Maintenance . . . . .	8
4. Water Quality . . . . .	9
5. Technology Employed . . . . .	9
6. Excreta Disposal . . . . .	10
B. Institutional and Financial Aspects . . . . .	10
1. National Agencies . . . . .	10
2. Participation of the Agency and the Community. . . . .	14
3. Rates . . . . .	14
4. Community Development . . . . .	16
C. Socioeconomic Aspects . . . . .	16
1. Planning . . . . .	16
2. Selection Criteria . . . . .	17
D. Problems in Program Execution . . . . .	20
E. Conclusions and Recommendations . . . . .	20
Annex A . . . . .	23
Survey	
1. Argentina . . . . .	25
2. Bolivia . . . . .	28
3. Brazil . . . . .	31
4. Chile . . . . .	34
5. Colombia . . . . .	37
6. Costa Rica . . . . .	40
7. Dominican Republic . . . . .	43
8. Ecuador . . . . .	46
9. El Salvador . . . . .	49
10. Guatemala . . . . .	52
11. Honduras . . . . .	55
12. Mexico . . . . .	58
13. Nicaragua . . . . .	61
14. Panama . . . . .	64
15. Paraguay . . . . .	67
16. Peru . . . . .	70

A high proportion of Peru's rural population lacks potable water services. IDB's action has contributed to alleviate this situation even in remote communities.



## I. INTRODUCTION

Twenty years ago the situation of water supply and sewerage coverage -i.e. the percentage of population served was inadequate and deficient. Out of an estimated population of 200 million, 100 million of whom resided in cities, only 40 million had house connections, about 20 million had access to public sources, and only 6 million in the rural areas had some form of supply.

According to the information provided by borrowers and official agencies and shown in Table I, the situation as of 31 December 1980 is completely different. Out of a total population of 342 million, about 162 million of the 216 million city dwellers had household connections and some 24 million rural dwellers had water supply, a fourfold increase over the 1960 level.

The coverage represented by those figures takes the following form:

o urban water supply:	75%
o rural water supply:	19%
o urban sewerage:	34%
o rural sewerage:	12%

Bank financing has helped achieve the foregoing objectives, particularly in the area of rural water supply, where 38 loan operations to 16 countries have been approved, representing a total investment amounting to US\$489 million, of which the Bank's contribution represents more than US\$260 million.<sup>1/</sup> Benefits have thus accrued to some 6,000 communities having a design population of over 8 million.

The Bank was the first international financing agency to assist the region in this area: its contribution over the 20-year period accounts for 16% of all such investment, twice the aggregate amount contributed by all other international organizations.

The present work is an effort to evaluate the results obtained thus far in

<sup>1/</sup> See Table II.

TABLE I  
 INTER-AMERICAN DEVELOPMENT BANK  
 SANITARY ENGINEERING SECTION - PRA  
 WATER SUPPLY AND SEWERAGE SERVICES IN IDB  
 MEMBER COUNTRIES AS OF 31 DECEMBER 1980 a/  
 PRELIMINARY INFORMATION  
 (Population in Thousands)

Country	Total Pop.	Total Population				Degree of Urbaniz.	Ceiling for Urban Pop.	Urban Population				Total Pop.	Rural Population				
		with Water	%	with Sewerage	%			with Water	%	with Sewerage	%		with Water	%	with Sewerage	%	
ARGENTINA	27,863	16,141	58	12,560	45	80	3,000	22,359	14,636	65	8,060	36	5,504	1,505	27	4,500 <sup>b/</sup>	82
BARBADOS	250	236	94	37	15	46	-	116	102	88	37	32	134	134	100	-	--
BOLIVIA	5,370	1,842	34	1,022	19	45	2,000	2,430	1,577	65 <sup>f/</sup>	892	37	2,940	265	9	130	4
BRAZIL	119,099	66,531	56	25,386	21	68	2,000	80,479	64,600	80	25,000	31	38,620	1,931	5	386	1
CHILE	11,260	8,745	78	6,406	57	81	3,000	9,095	8,408	92	6,195	68	2,165	337	16	211	10
COLOMBIA	28,276	15,944	56	11,441	40	63	2,500	17,804	13,910	78	10,850	61	10,472	2,034	19	591	6
COSTA RICA	2,600	2,095	81	973	37	56	2,000	1,466	1,404	96	372	25	1,134	691	61	601 <sup>b/</sup>	53
DOMINICAN REPUBLIC	5,485	2,220	40	691	13	51	2,000	2,806	1,323	47	691	25	2,679	897	34	-	-
ECUADOR	8,354	3,456	41	2,848	34	44	2,000	3,647	2,892	79	2,344	64	4,707	564	12	504	11
EL SALVADOR	4,540	2,477	55	1,602	35	42	2,000	1,903	1,428	75	914	48	2,637	1,049	40	688	26
GUATEMALA	7,260	3,234	45	2,068	28	37	2,000	2,650	2,308	87 <sup>d/</sup>	1,192	45	4,610	926	20 <sup>e/</sup>	876 <sup>g/</sup>	19
GUYANA	849	542	64	130	15	47	2,000	396	272	69	119	30	453	270	60	11	2
HAITI	5,011	338	7	117	2	25	2,000	1,274	271	21	117	9	3,737	67	2	-	-
HONDURAS	3,691	883	24	571	15	36	2,000	1,324	668	50	569	43	2,367	215	9	2	-
JAMAICA	2,247	1,127	50	153	7	69	4,000	1,557	620	40	133	9	690	507	73	20	3
MEXICO	67,383	33,539	50	30,217	45	58	2,500	38,767	25,586	66	26,211	68	28,616	7,953	28	4,006	14
NICARAGUA	2,636	1,013	38	735	28	51	2,000	1,344	924	69	503	37	1,292	89	7	232 <sup>b/</sup>	18
PANAMA	1,830	1,246	68	1,363	74	49	1,500	900	852	95	614	68	930	394	42	749 <sup>b/</sup>	81
PARAGUAY	3,000	629	21	1,931	64	36	4,000	1,087	503	46	309	28	1,913	126	7	1,622 <sup>c/</sup>	85
PERU	17,780	9,011	51	6,676	38	65	2,000	11,480	7,814	68	6,613	58	6,300	1,197	19	63	1
TRINIDAD & TOBAGO	1,165	588	50	292	25	64	5,000	745	320	43	252	34	420	268	64	40	10
URUGUAY	2,912	2,244	77	1,359	47	81	-	2,368	2,229	94	1,359	57	544	15	3	-	-
VENEZUELA	14,033	11,241	80	7,268	52	78	1,000	10,897	9,117	84	7,091	65	3,136	2,124	68	177	6
TOTAL	342,894	185,322	54	115,846	34	-	-	216,894	161,764	75	100,437	46	126,000	23,558	19	15,409	12
YEAR 1970 <sup>h/</sup>	262,033	96,793	37	61,984	24	-	-	142,106	80,168	56	51,007	36	119,927	16,625	14	10,977	9

a/ Based on information supplied by the Field Offices.

b/ Including other sources of supply.

c/ Not including public sewerage.

d/ 50% household connections and 37% easy access.

e/ 5% with household connections and 15% with easy access.

f/ 20% with household connections and 45% with easy access

g/ Latrines only.

h/ Results obtained from "IDB Preliminary Survey of January 1, 1970" not including Guyana.

TABLE II  
INTER-AMERICAN DEVELOPMENT BANK  
LOAN OPERATIONS FOR RURAL WATER SUPPLY  
(Situation as of December 31, 1981)

No.	Country (Stage)	Loan Number	Millions of US\$		Number of Communities	Future Population (in 000)	Status of Physical Progress (%)
			Amount of Loan	Total Cost			
1	Argentina (I)	114/TF	5.0	10.0	214	449	100
2	Argentina (II)	302/SF	12.0	32.0	194	400	100
3	Argentina (III)	526/SF & 14/IC	37.0	69.0	176	340	60
4	Argentina (IV)	661/SF & 83/IC	53.2	89.3	160	395	-
5	Bolivia (I)	154/SF	1.8	3.5	60	160	100
6	Brazil 1/	61/IC & 620/SF	2.7	7.1	63	30	-
7	Brazil 1/	69/IC & 640/SF	7.8	15.2	80	102	-
8	Chile (I)	74/TF	2.5	6.0	200	137	100
9	Chile (II)	499/SF	7.5	16.8	142	132	99
10	Chile (III)	393/OC	19.9	33.2	220	150	-
11	Colombia	475/SF	4.2	10.2	65	14	50
12	Colombia 1/	414/OC, 94/IC & 677/SF	3.3	4.3	28	23	-
13	Costa Rica	64/SF	1.3	3.4	81	130	100
14	El Salvador 2/	6/TF	1.0	1.4	143	228	100
15	El Salvador 2/	90/TF	0.5	0.8	68	108	100
16	El Salvador 2/	324/SF	1.5	2.3	102	160	100
17	El Salvador 2/	504/SF	4.7	8.9	137	125	54
18	Guatemala (I)	113/SF	1.3	2.1	92	80	100
19	Guatemala (II)	319/SF	2.6	3.9	117	110	100
20	Guatemala (III)	446/SF	7.0	10.6	126	113	100
21	Haiti (I)	609/SF	4.1	6.8	100	126	-
22	Honduras (I)	401/SF	4.0	4.3	145	137	100
23	Honduras (II)	587/SF	4.5	7.3	235	171	25
24	Mexico 1/	443/SF & 293/OC	6.8	18.3	420	250	100
25	Nicaragua (I)	171/SF	2.0	4.1	79	150	100
26	Nicaragua 2/	341/SF	2.5	3.2	64	415	100
27	Nicaragua 2/	476/SF	9.3	11.8	47	485	70
28	Panama 2/	146/SF	1.4	2.0	37	38	100
29	Panama 2/	345/SF	4.5	6.0	60	61	100
30	Panama 2/	637/SF & 90/IC	4.7	7.3	32	67	-
31	Peru (I)	75/TF	1.7	3.1	153	190	100
32	Peru (II)	142/SF	3.1	7.2	309	480	100
33	Peru (III)	392/SF	4.7	12.6	264	350	100
34	Dominican Rep. (I)	167/SF	2.0	3.3	114	220	100
35	Dominican Rep. (II)	285/SF	4.1	6.7	158	300	100
36	Dominican Rep. (III)	654/SF & 4/SD	8.1	10.0	55	68	-
37	Venezuela (I)	14/TF	10.0	22.7	482	575	100
38	Venezuela (II)	99/TF	10.0	24.4	700	720	100
T O T A L			264.3	489.1	5,922	8,189	

1/ Figures are for the portion of a comprehensive rural development program earmarked for rural water supply system.

2/ In an urban and rural water supply and sewerage program.

3/ This project also includes a loan from CIDA (Canada) in the amount of US\$1,238,000.



Financed with the contribution of a \$4,1 million IDB loan, a program carried out in the Dominican Republic provided water services to 180 communities. The town of Pedro Sánchez, in the Province of El Seibo, was one of the towns that gained a potable water system for the first time in 1977.



programs executed in Latin America. Our purpose is to learn from experience, correct any errors that may have occurred and arrive at criteria that will enable member countries to continue planning investments in this subsector to comply with the Mar del Plata plan of action, which called for providing the largest possible percentage of population with water supply, by the year 1990, giving preference to marginal urban zones and rural areas.<sup>1/</sup>

## II. EVALUATION METHODOLOGY

In 1981, all Bank member countries were asked to take part in a survey. We have selected the data furnished by 16 countries,<sup>2/</sup> including two countries where the Bank has not yet financed any rural programs, i.e. Ecuador and Paraguay.

Despite efforts to standardize the survey questionnaire material, certain data have had to be deleted and others supplemented. We are nonetheless most grateful to the 16 countries for the efforts and interest they have displayed in this exercise.

The questionnaire covers the following areas: 1) Subsector planning for the decade; 2) National agencies responsible for program planning and execution; 3) The design criteria utilized; 4) Present service levels and criteria; 5) Participation by the agency and by the community; 6) Water quality criteria; 7) Technology utilized; 8) Criteria for selection of communities; 9) National policy on excreta disposal; 10) Major problems affecting program execution. Survey responses with the corresponding information are included in Annex A.

<sup>1/</sup> United Nations Conference on Water, March 1977. Water and Sanitation Decade.

<sup>2/</sup> Argentina, Bolivia, Brazil, Chile, Costa Rica, Colombia, Dominican Republic, El Salvador, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, and Peru.

### III. RESULTS

#### A. TECHNICAL ASPECTS

##### 1. Design Criteria

Every country has its own design criteria, and there are certain general similarities. The design period is usually 20 years: because of the limited population growth - ranging between 2% and 3% annual arithmetic progression - shorter periods are not justified.

Consumption figures range from 30 liters per person per day (l.p.p.d.) for public sources and about 100 lppd. per household connections. There was only one country where household use reached 250 lppd, which we find to be too high for household supply. Consumption varies: maximum day of 1.2 to 1.3, and peak hour 2.0 to 4.0. Reserve supplies for hourly regulation of consumption range between 20% and 30% of the annual daily average. Lastly, the pressure adopted ranges between 6 and 50 meters, which is acceptable for this type of project.

In reviewing certain programs, we have noted that sufficient technical attention was not given to the minimum capacity of the source and the reliability of production in dry seasons. As a result, the Bank requires verification of such factors before authorizing the execution of works. In some countries, however, the design criteria calls for selecting the underground source, drilling the well and checking its yield, thereafter proceeding to design the project. This practice is highly recommended and should be applied in all rural programs even when it is possible to extend the project preparation period.

##### 2. Service Levels

We have attempted to identify the national service level policy adopted by the various countries. In six countries, water is supplied exclusively

through household connections<sup>1/</sup> and in two of them, meters and/or consumption regulators are used. In nine countries, the supply system is mixed, i.e. about 40% through house connections and 60% from public sources.<sup>2/</sup>

Only one country uses an original modality known as "simplified systems".<sup>3/</sup>

The typical household connection (service level 1) consists of a 1/2 inch service connection to the distribution network and a tap inside the dwelling to avoid having to carry water in from outside. In some houses, depending on the socioeconomic conditions, the owner extends this line inside the house and installs a minimal unit consisting of a lavatory, shower and toilet.

Public sources (service level 2) consist of a 3/4 inch extension ending in a faucet. These are strategically placed to provide access for some 30 to 40 houses. Under this system, the water still has to be carried by the population, but the distances are short and the water supply is potable.

Simplified systems (service level 3) offer the most appropriate solution for certain very low-income areas where water is scarce. They consist of small wells that yield less than 1.0 liters per second, a short pressure line and a raised tank about 7 m. above the ground with a capacity of 10 to 12m<sup>3</sup>, whereby six standpipes are supplied. Sometimes an extra extension is included to provide animals with drinking water in periods of drought.

The adoption of different service levels is determined by surveys conducted by the national agencies during the initial stages of community selection. The definition of service levels is extremely important since it allows adequate scaling of the project in accordance with the population's capacity and needs.

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1/ Which we call service level 1.  
2/ Which we call service level 2.  
3/ Which we call service level 3.

### 3. Operation and Maintenance

In six countries, the mechanism for operation and maintenance of the system is controlled at the central level through regional offices. In the remaining countries, operation and maintenance are the responsibility of community agencies, which generally receive very little support from the central entity. This has resulted in deterioration and malfunction of a high percentage of water supply systems, particularly those supplied by pumping and/or treatment. Our experience has been that this situation is due, on the one hand, to lack of technical ability of the community agencies themselves and, on the other, to the low economic level of the population, who do not have the wherewithal to finance major repairs such as a new pump and/or motor, to purchase chlorine, or even to clean and replace the filter bed.

When rural programs were first set up in Latin America two decades ago, emphasis was placed on keeping the national agency from having to apply any administrative surcharge on the cost of water supply to users and allowing the motivated community to feel that they were the owners of the water supply system, as a basis for achieving adequate maintenance. The central supervision and support that the program executor was to provide to small and weak community agencies were an implicit part of this system. In practice, it has been found that the executing units are not geared to supervise operation and maintenance and, furthermore, by the very fact of their nature as executing agencies, they concentrate exclusively on this activity and lack the necessary motivation for performance of operation and maintenance.

In countries where the mechanism is located at the central level, the regional units are better equipped than community entities and thus provide better operating and maintenance service, prorating the cost among the institutions and charging rural users a modest rate that does not even cover the cost of administration, operation and maintenance. In other words, a cross-subsidy is used. Future success of rural programs depends on solving the operation and maintenance problem, and we consider this activity to be one of the most critical in planning for the decade.

#### 4. Water Quality

Almost all of the countries have national standards and those that do not have adopted the World Health Organization (WHO/PAHO) standards. In practice, however, little attention is paid to the quality of the water distributed. Rarely is the water chlorinated. There are three reasons for this, one being that it is not considered indispensable and necessary; two, there is no operator to do so; and three, there is no budgetary allocation for its purchase. If, as is usually the case, the community unit receives its support from the central agency, the problems persists and the water supply does not meet the established standard. It has also been observed that there is no sanitary authority to determine the quality of the water by means of a sampling system.

In some programs, one of the selection criteria is the availability of good quality water, thus making it possible to eliminate or reduce the need for treatment.

We believe that in many countries a thorough review of water quality standards should be conducted, setting parameters that must be met from a practical standpoint for the water to be considered potable, including bacteriologic limits. Such revision should also take into account the problem of possible pollution of water from public sources.

#### 5. Technology Employed

In three countries, it was found that the technology used for these programs was not the most appropriate to the socioeconomic and cultural conditions of the communities. Appropriate or intermediate technology is understood to imply simple designs that are easily operated and maintained, intensive use of the abundant labor found in rural communities and the use of locally produced materials. System designers should have access to the most recent advances in intermediate technology to adopt whatever is most applicable to the particular case. In this respect, we should like to mention the program conducted by the Centro Panamericano de Ingeniería Sanitaria (CEPIS) which has been under way for the last two

years thanks to technical cooperation from the Bank. This is a research project on appropriate technology in water supply and sewerage systems and in the near future it will undertake the task of finding the most satisfactory technology for lifting water in rural supply systems.

The design of slow-filter plants, use of simple chlorinated devices, extensive use of break pressure instead of pressure-reducing valves, stone-work reservoirs built by local masons using local materials, generalized use of PVC plastic pipeline, and the like are elements that characterize the type of technology and determine whether or not it is appropriate.

## 6. Excreta Disposal

The survey attempted to determine, on the one hand, national excreta disposal policy and, on the other, whether this responsibility lay with the same agency that is responsible for rural water supply. The reason for this investigation is the close relationship between water supply and proper excreta disposal. Furthermore the concept of such disposal is included in the postulate for the decade.

Only in four countries is the same agency responsible for supplying latrines. It was found, however, that those institutions have no plan or defined policy for coverage of this subsector.

In the remaining countries, there are programs for the installation of latrines and the responsibility rests with the agencies of the Ministry of Public Health.

## B. INSTITUTIONAL AND FINANCIAL ASPECTS

### 1. National Agencies

#### a) Organization

The ministries of public health have traditionally been, and, in some

cases, still are, responsible for executing national programs, including latrine building programs.

The operating difficulties inherent in the functions of a ministry and the requirements of credit organizations made it advisable to establish autonomous national agencies and/or executing units, as the following table shows:

TABLE III

No.	Country	Other Ministry		Name
		Ministry of Health	and/or Autonomous Agency	
1.	Argentina	-	X	SNAP
2.	Bolivia	X	-	DSA
3.	Brasil	x	-	Varies according to state
4.	Chile	-	X	SENDOS
5.	Costa Rica	-	x	AyA
6.	Colombia	x	-	INS
7.	El Salvador	x	-	PLANSABAR
8.	Ecuador	x	-	IEOS
9.	Guatemala	-	x	UNEPAR
10.	Honduras	-	x	SANAA
11.	México	-	x	SAHOP
12.	Nicaragua	-	x	INAA
13.	Panamá	-	x	IDAAN
14.	Paraguay	-	x	SENASA
15.	Perú	x	-	DSR
16.	Dominican Rep.	-	x	INAPA
	T o t a l	<u>6</u>	<u>10</u>	

The information the survey sought to collect was intended to evaluate the present organizational capacity of the agencies. The results were as follows:

- i) in 13 countries they were considered adequate.
- ii) in two countries the agencies were being reorganized.
- iii) in one country the agency was not considered adequate to carry out a national program because of lack of human resources.



In Chile, the IDB has helped finance two potable water system benefiting 570 rural communities with populations between 150 and 3,000 inhabitants, one launched in 1964 and the second in 1976.



b) Financing of national programs

Ecuador is the only country that has national programs financed with domestic funds. However, IEOS is exploring the possibility of obtaining an international loan for executing a further stage in the 1980's. It should also be noted that, in Brazil, external financing has been insignificant.

c) Regular operating and maintenance programs

The operation and maintenance of the systems constructed is one of the critical areas to which special attention should be paid in future stages. In our view, the principal cause has been the institutional pattern whereby the agency that executes the works is not responsible for their operation and maintenance, which is carried out at the local level by community agencies that by definition are technically and economically weak. While 12 countries do not have a regular maintenance program, the other four do, although it is usually limited to corrective maintenance. Among the countries that have a maintenance program, some have not delegated that responsibility to the communities.

We understand that the foregoing institutional pattern was primarily adopted for financial reasons, i.e., not to overload the water rates with the administrative costs of the central agency. On the other hand, this problem was solved by three agencies that operate and maintain rural water supply systems through a subsidy from urban users.

d) Training program

Only six countries have training programs and these are usually carried out at three levels: central, provincial and local. The results indicate that there is little or no training at the local level and, consequently, not only the technical area but also the commercial and financial areas are very weak. In the rural programs, training is another critical area that warrants special considerations.

e) Areas of institutional weakness

In addition to those mentioned in subsections (c) and (d) above, the survey showed that some agencies face a manpower problem, that is, they do not have sufficient staff; in addition, low salaries cause qualified personnel to move to other, better paid sectors.

2. Participation of the Agency and the Community

Community participation is a basic element in the philosophy that underlies the execution of national rural water supply programs. The first promotional task is to visit the communities and identify their interest and motivation. Next the need for cooperation during execution is established; works committees are set up to provide labor, haul materials or install small works; steps are taken to establish the community agency, which will eventually be responsible for operating and maintaining the system.

Community participation is estimated to cover between 10 and 30% of the cost of the works and, in a few cases, takes the form of a cash contribution. Cash contributions are regularly made in only one country and occasionally in another four.

3. Rates

The rates charged in rural water supply systems are usually calculated to cover the administrative, operating and maintenance costs of the system. Four countries use a national rate, which is subsidized by the income from the urban sector; in three countries, the rate covers depreciation and all or part of the external loan, in addition to the foregoing costs.

The Bank has several alternative tariffs according to the type of project and the socio-economic characteristics of the users; for the rural sector, the rates must be sufficient to cover the administrative, operating and maintenance costs of the system, and the pertinent contractual clause also states that these rates should only cover depreciation where possible.

For the residents of La Guama, a 300-people Honduran village, the installation of a modest potable water system brought a basic change in their daily lives. The project, financed by the Bank, extended this services to 90 communities with a total population of 87,000.



As a rule, the rates do not amount to more than 3% of the minimum monthly income although in two countries they amount to 5%. Because of the type of basic billing and collection systems used in these communities, collections are in arrears and, if no reserve for depreciation is set up, the maintenance activities carried out by the communities themselves are insignificant.

#### 4. Community Development

The concept of community development is deeply rooted in the region. The national planning agencies usually have a group of promoters or social workers that ascertain the concerns and desires of the communities. Visits are made; films are shown; clear explanations are given of the health problems the lack of safe water can cause; leaders are identified to head up water supply committees; and the community is then organized for construction of the system, which then becomes the operating agency when completed.

Nevertheless, when the system is constructed, promotion ceases, and the communities are left without technical support for the more difficult task of operation and especially of maintenance.

As already stated, the central agencies should increase the support they give to the communities; part of this reinforcement should be a continuation of community promotion, including training. The communities need someone from outside to tell them what their problems are and to motivate them to find solutions to them. The social worker is the ideal person for the job.

#### C. SOCIO-ECONOMIC ASPECTS

##### 1. Planning

More than 50% of the countries have national plans. Many of them have executed the first three stages; some have initiated the fourth stage; and others are considering its initiation this year. According to the

historical trend, as many as two additional stages could be executed in the decade, which would require a total investment of US\$30-250 million per country.

In planning the water and sanitation decade, all the countries carried out an evaluation exercise and established goals; we believe that some of these goals are overly optimistic and unattainable so that this type of information has been adjusted in the survey information.

As for the type of population to be served, the plans of 15 countries cover only the concentrated population, which accounts for about 30% of the total rural population of each country.

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## 2. Selection Criteria

The selection of the communities that are to form part of a stage of the national programs is a lengthy process; it begins with a determination of the total number of communities in the country in the population range fixed in the program.

The next step is to identify the economic and social development programs and their relation to the rural water supply program, all of which dictates a simple tentative pre-selection. Then the national agency, through its community development unit, organizes visits to the communities and carries out a socio-economic survey, which is the basic component of the project study; it attempts to assess the interest and motivation of the community in participating in the construction of the system and in making contributions to the project, its capacity and interest in administering, operating and maintaining the system when it is completed and, finally, the health problems that make construction of the system a priority, that is, historical information on gastrointestinal diseases, morbidity and mortality rates, especially infant mortality and mortality in children under four years of age.

The quality of the raw water and the suitability of its location for a gravity supply are also used as selection criteria. In selecting the

TABLE IV

| No. | CONSTRAINTS                            | C O U N T R I E S |    |    |    |    |    |    |    |    |    |    |    |    |    |    | AVER. | RANK<br>ORDER |    |
|-----|----------------------------------------|-------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------------|----|
|     |                                        | AR                | BO | BR | CH | CR | CO | EC | ES | GU | HO | ME | NI | PN | PR | PE |       |               | DR |
| 1   | Design criteria                        | 1                 | 10 | 1  | 1  | 4  | 7  | 5  | 5  | 2  | 3  | 0  | 5  | 1  | 5  | 0  | 5     | 3.4           | 13 |
| 2   | Preparation of designs                 | 2                 | 10 | 1  | 2  | 3  | 5  | 10 | 5  | 3  | 2  | 3  | 8  | 2  | 5  | 0  | 5     | 4.1           | 9  |
| 3   | Ejecution of works                     | 3                 | 7  | 1  | 2  | 7  | 5  | 7  | 5  | 6  | 6  | 3  | 7  | 3  | 5  | 0  | 5     | 4.5           | 7  |
| 4   | Technology                             | 1                 | 10 | 1  | 1  | 6  | 10 | 10 | 3  | 3  | 2  | 0  | 2  | 1  | 5  | 0  | 3     | 3.6           | 12 |
| 5   | Organization of the agency             | 4                 | 2  | 1  | 3  | 8  | 7  | 10 | 8  | 5  | 4  | 4  | 7  | 3  | 7  | 5  | 5     | 5.2           | 6  |
| 6   | Community motivation                   | 1                 | 4  | 1  | 1  | 5  | 3  | 5  | 8  | 4  | 2  | 8  | 3  | 5  | 3  | 0  | 9     | 3.9           | 10 |
| 7   | Establishment of<br>community agencies | 1                 | 8  | 2  | 1  | 5  | 3  | 5  | 6  | 3  | 5  | 7  | 3  | -  | 3  | 0  | 7     | 3.7           | 11 |
| 8   | External financing                     | 2                 | 10 | 1  | 1  | 5  | 10 | 10 | 10 | 10 | 3  | 4  | 10 | 4  | 9  | 10 | 10    | 6.8           | 2  |
| 9   | Local contribution - community         | 2                 | 5  | 10 | 3  | 6  | 3  | 10 | 5  | 4  | 2  | 4  | 1  | 3  | 10 | 0  | 0     | 4.3           | 8  |
| 10  | Local contribution - national          | 2                 | 3  | 8  | 1  | 4  | 10 | 10 | 5  | 6  | 6  | 7  | 10 | 1  | 8  | 0  | 5     | 5.4           | 5  |
| 11  | Operation and maintenance              | 5                 | 10 | 6  | 6  | 9  | 10 | 10 | 10 | 10 | 8  | 8  | 7  | 3  | 5  | 10 | 10    | 7.9           | 1  |
| 12  | Training                               | 2                 | 9  | 3  | 2  | 9  | 10 | 10 | 10 | 6  | 6  | 7  | 7  | 5  | 6  | 0  | 10    | 6.4           | 3  |
| 13  | Rates                                  | 4                 | 8  | 3  | 5  | 8  | 5  | 5  | 10 | 5  | 5  | 10 | 5  | 5  | 4  | 10 | 5     | 6.1           | 4  |

|                  |                           |
|------------------|---------------------------|
| AR = Argentina   | GU = Guatemala            |
| BO = Bolivia     | HO = Honduras             |
| BR = Brazil      | ME = Mexico               |
| CH = Chile       | NI = Nicaragua            |
| CO = Colombia    | PN = Panama               |
| CR = Costa Rica  | PR = Paraguay             |
| EC = Ecuador     | PE = Peru                 |
| ES = El Salvador | DR = República Dominicana |

systems, preference is given to those in which water comes from a spring that does not need to be treated or, if it is surface water, has a E coli index below the maximum permitted by the national standard, so that it can be rendered safe by chlorine treatment. To ensure easy operation, the location of the source should be such as to permit a gravity system. However, if an alternative source that can be pumped is available nearer to the community, an economic study is usually made. Access facilities that permit easy delivery of materials to the site and thus hold down the cost of the works is another selection criterion. A further criterion used by some countries is that the water supply system should supplement the health service.

Participation of the community and its willingness to provide labor and/or cash and operate the system is another criterion, as is the technology.

Finally, we come to the cost criterion. In this regard, we must point out that since we are dealing with a package of multiple works, of which a representative sample is normally analyzed, some economic criterion has to be established. When these programs were started 20 years ago, a maximum cost per person served was established as the economic criterion; as a parameter it suffered from the defect of not including operating and maintenance costs and of only covering the initial investment. This criterion was subsequently replaced by one that measures the economic efficiency of the projects; it establishes a ceiling and projects above it are eliminated. The value of this method depends on how representative the sample is; its disadvantage is that it does not make it possible to assess the economic benefits, although a great advantage is that it can be easily used once the ceiling is determined and agreed upon. The Bank has recently developed a simple method of calculating the cost/benefit ratio, which is then related to the cost/effectiveness ratio. In a project in which virtually all the systems have the same type of ground water supply, the correlation between the two ratios was found to be high. All the countries pay special attention to costs and endeavor to minimize them and thus optimize the investment.

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D. PROBLEMS IN PROGRAM EXECUTION

This part of the survey requested a subjective appreciation of the principal constraints on the agencies in executing rural water supply programs; these were to be ranked from 0 to 10. Table IV summarizes the results obtained. As the table shows, the principal constraints by rank order were as follows: 1) Operation and maintenance; 2) External finance; 3) Training; and 4) Rates.

In our opinion, these four areas are the most critical and should be given special attention in the planning of the sector during the decade. It should be noted that three of them are institutional constraints, so that even if the financial constraints were solved, the institutional constraints would still be present.

E. CONCLUSIONS AND RECOMMENDATIONS

The principal conclusions and recommendations derived from the survey are summarized below:

1. More than 50% of the countries have national plans. All the countries should draw up such plans as soon as possible to guide their future activities for achieving the coverage goals established for the decade.
2. In almost all the countries, rural water supply programs are aimed at the concentrated population, which represents about 30% of the total sector. Some way of providing the 70% remaining segment of the rural population with water service should be incorporated in the planning of the sector.
3. Although, according to the survey, the agencies in charge of these programs are usually said to be adequate, the respondents later state that they face manpower, operation and maintenance, and training problems, which shows that their organization is deficient. The interpretation is that the organizations are deemed adequate only for executing the programs, that is, construction activities, and that the other additional activities that should be carried out if the projects are to be appropriately implemented, are neglected.
4. Operation and maintenance and training are the most critical areas in planning for the decade. Indeed, 12 countries do not have a regular maintenance program and only six countries pay attention to the training.

5. All the countries have design standards that resemble one another to some extent and are acceptable. However, it was found that the source of supply was not always selected in accordance with adequate technical criteria and its output during the dry season is not ascertained. These standards or, if they do not exist, a simple method of verifying the hydrology, including the type and frequency of the field tests, should be incorporated.

It was also found that, in some countries in which a ground water supply is used, first the well is drilled and, once its yield is known, the engineering project is then developed. This practice is very advisable, although it could lengthen the project preparation period.

6. As for national policy regarding service levels, it was found that, in six countries, supply is solely by means of household connections and in nine countries it is mixed; only one country uses simplified systems.

Given the magnitude of the task of achieving the goals of the decade the countries should revise their service levels and, to establish them, should use a practical approach that takes into account the following factors among others: a) extension of coverage; b) minimization of investments; c) simplification of operation and maintenance.

7. Community participation is an integral part of the philosophy that underlies these programs and should be preserved and given the necessary technical support. The success of the program depends on a decision by the community to participate in it and therefore promotion, education and training activities are extremely important and necessary.

The arrangement whereby the community acts as the operating agency of the system should receive major attention, and the delegation of operating and maintenance activities to the local level should be reviewed. This arrangement would be suitable if it were certain that the central agency would give the community its full support in its operation, maintenance and training activities.

8. The rates should be kept low so that, given the socio-economic characteristics of the community, all the users can pay them. The rate level should not be lower than the administrative, operating and maintenance costs at the local level so as to persuade the users to make optimum use of the service.

To achieve the foregoing objective, attention should be given to costs, including operation and maintenance, from the time the project is conceived, and preference should be given to simple projects that involve minimum costs and easy operation. Four countries use a subsidized national rate and three countries, rates that cover not only the administrative, operating and maintenance costs but also all or part of the external loan. The rates represent between 3 and 5% of the minimum monthly income and, in all countries, collections are in arrears.

9. All the countries have national water quality standards. However, there is no quality control of the water consumed and, in many cases, the minimum disinfection treatments stipulated in the national standards is not applied. Since the project cost depends, inter alia, on the quality of the water chosen as a source of supply, these standards should be revised and more conservative and practical quality parameters, established.
10. By and large, all the countries use the technology most appropriate to the socio-economic characteristics of the communities. However, this is a field of continuing research and the national agencies should therefore obtain information on the latest developments. They should get in touch with CEPIS which for the last two years has been carrying out a Bank assisted project on appropriate technology.
11. All the countries have selection criteria considered appropriate and all of them include some measurement of economic efficiency.
12. There is no clear-cut policy on excreta disposal. The agency in charge of rural water supplies is responsible for latrines in only four countries. Since the sanitary disposal of excreta is also part of the goals of the decade, it should be incorporated into the general planning, even though it is the responsibility of other agencies.
13. In accordance with the opinion expressed by the countries, the most important constraints to be dealt with in the decade are: operation and maintenance, training, rates, and external financing. We believe that the countries should focus their efforts on solving the first three problems, which are institutional in nature, since external financing will always be available for good engineering projects that can be appropriately implemented and maintained.

ANNEX A

SURVEY

COUNTRY - ARGENTINA

1. National Plan of Rural Water Supply Yes, there is one.
  - a) Scattered or concentrated population: Only concentrated population between 100 and 10,000.
  - b) Number of localities in the plan: There exist 2,389 localities that would be in the plan within the aforementioned rank.
  - c) Stages of execution: 3 stages already executed. In the decade two more will be executed.
  - d) Estimated cost in US\$: Total estimated cost in the decade US\$250 million.
  - e) Goals of population served in the decade:
    - i) House connections: 800,000 pop.
    - ii) Other means: Standpipes: 20,000 pop.
2. Responsible organization: Servicio Nacional de Agua Potable y Saneamiento Rural SNAP.
  - a) Organization and personnel: SNAP design suitable at central and regional levels. Adequate personnel.
  - b) Cost of programs, and local and external contributions:

| Program | Local | External |
|---------|-------|----------|
| BID I   | 10.7  | 5.0      |
| BID II  | 21.6  | 12.0     |
| BID III | 41.3  | 16.0     |
  - c) Regular program of operation and maintenance: Nonexistent. Provincial services (SPAR) helps the Juntas Administradoras.
  - d) Training program: There are 3 programs: central, provincial and community level.
  - e) Areas of institutional weakness: Lack of personnel in provincial level caused by policy in public expense.
3. Design criteria:
  - a) Period: 20 years.
  - b) Projection of population, criteria: Arithmetic progression. Rate 2.5%.
  - c) Consumption: Between 100 and 200 l.p.p.d.

- d) Maximum day coefficient: 1.2 annual average.
- e) Maximum hour coefficient: 1.5 of maximum day.
- f) Volume regulation: 20% of maximum day.
- g) Pressures: i) maximum:50.0 m. ii) minimum:10.0

4. Service levels:

- a) Criteria: Norms establish that service will be furnished through house connections and that consumption control can be done either by meters or regulators. Only in extreme cases public standpipes are utilized.
- b) Coverage: Total concentrated population: 1,105,000. i)connections 500,000 pop.: 45.25%. ii) connections with meters: 500,000 pop.: 45.25%; iii) public standpipes: 105,000 pop.: 9.5%. Total scattered pop.: 400,000 pop. i) public standpipes 400,000 pop., 100%.

5. Entity/community participation:

- a) Kind of participation: The community must contribute between 10 and 15% of the cost in money, materials or manpower during construction.
- b) Financial contribution: Yes, as indicated above.
- c) Process of operation and maintenance - level: Done by the community, supervised by SPAR.
- d) Administration of systems: Done by the community which could be a public services cooperative or a civil society with legal responsibility.
- e) Water rates - type and coverage: There is no unique tariff, it is calculated for each system in order to cover the administration, operation and maintenance, depreciation and generally the IDB loan.
- f) Water rates/minimum wage: Doesn't go over one day wage/month.

- g) Community collection problems: It exists, caused by the seasonal work of the beneficiaries. It is estimated that the delays do not exceed 20% of the monthly collections.
- h) Organization of community promotion: Promotion is done through SPAR, each one has a group formed with social workers, which vary in their size and budget according to the importance of the program within the province.
6. Water quality - norms: National norms.
7. Technology used in the programs: Technology is appropriate according to the socioeconomic conditions. Simple systems, treatment plants of slow sand filters and dynamic filters, PVC and cement asbest in networks and polyethylene piping in house connections, consumption regulators and flow meters. Only in a few cases plants to treat excess of fluor were built because of the quality of the natural water.
8. Selection criteria: a) sanitary reasons, b) water supply sources, c) economic situation of the community - capacity of payment, d) social reasons, e) cost-efficiency.
9. Excreta disposal: SNAP has the responsibility but has not started yet the national program.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)1, b)2, c)3, d)1, e)4, f)1, g)1, h)2, i)2, j)2, k)5, l)2, m)4

COUNTRY - BOLIVIA

1. National Plan of Rural Water Supply Nonexistent.
  - a) Scattered or concentrated population: Concentrated population between 200 and 2,000.
  - b) Number of localities in the plan: 528 communities in the aforementioned range.
  - c) Stages of execution: Two stages during the decade.
  - d) Estimated cost in US\$: US\$40 millions.
  - e) Goals of population served in the decade:
    - i) House connections: 182,000 pop.
    - ii) Other means: 1,200,000 pop.
  
2. Responsible organization: The División de Saneamiento Ambiental (DSA) is in charge of the concentrated population, and the Servicio Nacional de Desarrollo de Comunidades (SNDC) the sparse one.
  - a) Organization and personnel: The sector is being reorganized.
  - b) Cost of programs, and local and external contributions:

| <u>Program</u> | <u>Local</u> | <u>External</u> |
|----------------|--------------|-----------------|
| BID I          | 1.7          | 1.8             |
| AID            | 0.4          | 0.8             |
  - c) Regular program of operation and maintenance program: The DSA has a corrective maintenance program.
  - d) Training program: Nonexistent.
  - e) Areas of institutional weakness: i) operation and maintenance, ii) training, iii) organization, iv) human and financial resources.
  
3. Design criteria:
  - a) Period: 20 years
  - b) Projection of population, criteria: Arithmetic progression. Rate 1.5 to 2.5%.
  - c) Consumption: Between 40 and 60 lppd.(standpipes) between 60 and 80 " (valley areas) between 80 and 100 " (tropical areas).



- d) Maximum day coefficient: Between 1.2 and 1.5 of the annual average.
  - e) Maximum hour coefficient: Between 1.8 and 2.3 of the annual average.
  - f) Volume regulation: i) gravity systems: 15-20% of maximum day, ii) pumping systems: 30%
  - g) Pressures: i) maximum: 50.0 m. ii) minimum: 5.0 m.
4. Service levels:
- a) Criteria: The following levels for 1990 were established in the recent plan:
  - b) Coverage: i) house connections: 5%; ii) standpipes: 35%, iii) without service: 60%.
5. Entity/community participation:
- a) Kind of participation: It is not regulated. Community contribution is estimated at 30% of the cost of manpower and local materials.
  - b) Financial contribution: Eventually yes.
  - c) Process of operation and maintenance - level: O&M without the support of DSA is in charge of the committees of water supply.
  - d) Administration of systems: Water supply committees are in charge.
  - e) Water rates - type and coverage: There is no established rate. Rates are calculated solely to cover AOM costs.
  - f) Water rates/minimum wage: Rates usually represent 1% of minimum monthly wage.
  - g) Community collection problems: Yes, there are.
  - h) Organization of community promotion: The DSA has 160 sanitation technicians for the job of community promotion.
6. Water quality - norms:
- There are no national norms. OPS/OMS norms are adopted.

7. Technology used in the programs: The technology used to date is not the most appropriate. A consultant in appropriate technology is counseling the DSA.
8. Selection criteria: a) sanitary situation of the community; b) sources, c) access, d) cost.
9. Excreta disposal: DSA has not executed any programs in latrines. The communities work their own programs of latrines with some counseling from DSA.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates.
- a) 10; b) 10; c) 7; d) 10; e) 2; f) 4; g) 8; h) 10; i) 5; j) 3; k) 6; l) 9; m) 8

COUNTRY - BRAZIL

1. National Plan of Rural Water Supply Yes, there is a national program in execution.
- a) Scattered or concentrated population: Concentrated pop. up to 2000
- b) Number of localities in the plan: The goal for the number of localities is not yet fixed. It is hoped to take care of 17.7 million pop.
- c) Stages of execution: The first stage was executed between 76-69, and the second one is now being carried out for the period 80-85.
- d) Estimated cost in US\$: In 1980 for the period 80-85 an amount of US\$ 27 million was estimated for the implantation and construction of simple water services and constructions of latrines.
- e) Goals of population served in the decade: The goal is to serve with simple systems and latrines a pop. of 17.7 million by the end of 1985.
- i) House connections:
- ii) Other means:
2. Responsible organization: The following organizations are participants: Grupo Ejecutivo Interministerial; Ministerio de Salud; Nivel Estadual: Ministerio de Salud (federal delegations); Ministerio de Provisencia y Asistencia (Regional Superintendant); Ministerio Interior (SUDENE); and Secretaria de Salud y Planeamiento (State Government. Local level in charge of the Grupo Centros de Salud.
- a) Organization and personnel: Adequate.
- b) Cost of programs, and local and external contributions:
- | <u>Program</u>  | <u>Local</u> | <u>External</u> |
|-----------------|--------------|-----------------|
| DRI-BID Paraiba | 4.4          | 2.7             |
| DRI-BID Parana  | 7.3          | 7.8             |
- c) Regular program of operation and maintenance: Not reported.
- d) Training program: Not reported.

- e) Areas of institutional weakness: Not reported.
3. Design criteria:
- a) Period: The simplified water supply projects are designed for 10 years.
- b) Projection of population, criteria: The increase is set according to population range: from 33% to 50% in 20 years.
- c) Consumption: For 60% population: 80 l.p.p.d.  
For 40% left: 30 l.p.p.d
- d) Maximum day coefficient: 1.2 average annually.
- e) Maximum hour coefficient: 1.8 average annually.
- f) Volume regulation: Volume set according to population of 25 to 150 m3 (the larger the population the larger the reserve).
- g) Pressures: i) maximum: 50.0m. ii) minimum = 6.0m.
4. Service levels:
- a) Criteria: The national program establishes that 60% of the population should be supplied by connections and 40% by standpipes.
- b) Coverage:
5. Entity/community participation:
- a) Kind of participation: When possible, the community provides labor, pipe installation and small constructions.
- b) Financial contribution: Generally, there is no financial contribution.
- c) Process of operation and maintenance - level: Local authorities or community groups, when created.
- d) Administration of systems: Local authorities or community groups, when created.
- e) Water rates - type and coverage: The rates cover part of the AOyM. Usually about \$2 per house/month.
- f) Water rates/minimum wage: Around 40% of daily wages.
- g) Community collection problems: Yes.

- h) Organization of community promotion: In order to obtain a larger community participation, work is done in this area at program level.
6. Water quality - norms: Established national norms by the Asociación Brasileña de Normas Técnicas do exist.
7. Technology used in the programs: It is considered appropriate: Simple designs, maximum personnel utilization and local provision.
8. Selection criteria: a) Nonexistence of water service; b) Less than 2000 pop. not included in the Plan Nacional de Saneamiento - PLANASA; c) the water system should be complementary to the health services (PIASS).
9. Excreta disposal: The installation of latrines is contemplated by PIASS.
10. Problems in the development of the programs: a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates a)1, b)1, c)1, d)1, f)1, g)2, h)1, i)10, j)8, k)3, l)3, m)3.

COUNTRY - CHILE

1. National Plan of Rural Water Supply

Yes, it exists. SENDOS has executed two stages and is constructing a third one.

a) Scattered or concentrated population:

Concentrated population between 150 and 3000.

b) Number of localities in the plan:

Approximately 570 localities in the country's 13 regions.

c) Stages of execution:

The plan for the 10 years consists of three stages:

|     |         |          |
|-----|---------|----------|
| III | 1981-85 | 220 loc. |
| IV  | 1985-89 | 240 loc. |
| V   | 1989-90 | 110 loc. |

d) Estimated cost in US\$:

|                      |  |                      |
|----------------------|--|----------------------|
| Estimated costs are: |  | <u>Millions US\$</u> |
| III                  |  | 25.5                 |
| IV                   |  | 27.1                 |
| V                    |  | 12.3                 |

e) Goals of population served in the decade:

| <u>STAGES</u> | <u>POPULATION</u> |
|---------------|-------------------|
| III           | 125,000           |
| IV            | 90,000            |
| V             | 38,000            |

i) House connections:  
ii) Other means:

2. Responsible organization:

Servicio Nacional de Obras Sanitarias (SENDOS) is an arm of the Ministerio de Obras Públicas.

a) Organization and personnel:

The Departamento de Agua Potable Rural (DAPRU) is in charge of the rural program with adequate structure and personnel.

b) Cost of programs, and local and external contributions:

| <u>PROGRAM</u> | <u>Millions of US\$</u> |                 |
|----------------|-------------------------|-----------------|
|                | <u>Local</u>            | <u>External</u> |
| BID I          | 3.5                     | 2.5             |
| BID II         | 9.0                     | 7.5             |

c) Regular program of operation and maintenance:

Done by the community entities with central support.

d) Training program:

There is a training program both at a central level as well as the community entities.

e) Areas of institutional weakness:

Operation and maintenance.

3. Design criteria:

a) Period:

20 years.

- b) Projection of population, criteria: Geometric progression. 2% yearly rate;
  - c) Consumption: 60 - 100 l.p.p.d.
  - d) Maximum day coefficient: 1.2 - 1.5 of the yearly percentage.
  - e) Maximum hour coefficient: 1.5 maximum daily.
  - f) Volume regulation: 15-20% maximum daily.
  - g) Pressures:
    - i) maximum = 40.0 m.
    - ii) minimum = 8.0 m.l
4. Service levels:
- a) Criteria: The national program Consists of supply with house connections with a meter to control the use starting with the II stage.
  - b) Coverage: Total population: 337,000;
    - i) connections: 126,000- 37%;
    - ii) meter connections: 152,00-45%;
    - iii) other: 59,000 - 18%.
5. Entity/community participation:
- a) Kind of participation: The community contributes with labor, materials and money, which represents 10% of the cost.
  - b) Financial contribution: Yes, as it is indicated above.
  - c) Process of operation and maintenance - level: In charge of the community entities with the supervision of DAPRU.
  - d) Administration of systems: In charge of the community entity.
  - e) Water rates - type and coverage: There is not just one tariff, it is calculated for each system in order to cover AOyM. and part of the devaluation.
  - f) Water rates/minimum wage: It represents 25% of a monthly salary.
  - g) Community collection problems: There are some delays.

- h) Organization of community promotion:
- At a central level the section of community promotion is headed by a social worker and two assistants, a journalist, a technician on environmental sanitation and an accountant. At a regional level SENDOS has in each region social workers that form the rural water supply team.
6. Water quality - norms: There are national norms.
7. Technology used in the programs: Appropriate. Largely simple designs with groundwater supply. Construction of treatment plants is not recommended.
8. Selection criteria: a) population between 150 and 3000; b) housing concentration; c) access; d) supply sources; e) community interest and payment capacity; f) efficiency cost and cost-benefit ratio.
9. Excreta disposal: There is no policy or latrine program.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)1, b)2, c)2, d)1, e)3, f)1, g)1, h)1, i)3, j)1, k)6, l)2, m)5.



COUNTRY - COLOMBIA

1. National Plan of Rural Water Supply

There is no national program. Programs that are considered priorities are carried out by the Instituto Nacional de Salud.

  - a) Scattered or concentrated population: Concentrated population from 50 to 2,500 is taken care of by INS.
  - b) Number of localities in the plan: There are 4,262 localities in the aforementioned state.
  - c) Stages of execution: Two programs can be executed in the decade.
  - d) Estimated cost in US\$: US\$ 80 million is estimated as the total cost.
  - e) Goals of population served in the decade: Total population: 1,228,000.
    - i) House connections: Connections for 1,228,000 pop.
    - ii) Other means: None.
2. Responsible organization:

The national entity is the Instituto Nacional de Salud I.N.S., through it's División de Saneamiento Básico Rural.

  - a) Organization and personnel: It is considered adequate even though some changes should be introduced.
  - b) Cost of programs, and local and external contributions: INS has carried out some programs with the national budget and more recently with financing from the World Bank (PAN) and IDB (DRI) - has carried out 2 programs of integrated rural development in which waterworks are a component. Cost is estimated at US\$40 million with 50% of local counterpart.
  - c) Regular program of operation and maintenance: Routine maintenance is carried out by the administrative Juntas with the limited supervision of the INS sectional boards.
  - d) Training program: There is a program at institutional level carried out with budgetary limitations.

- e) Areas of institutional weakness: Organization, operation, maintenance and training.
3. Design criteria:
- a) Period: 20 years.
  - b) Projection of population, criteria: Geometric progression up to a maximum of 150% of the actual population.
  - c) Consumption: 80 to 120 l.p.p.d.
  - d) Maximum day coefficient: 1.2 yearly average.
  - e) Maximum hour coefficient: 1.8 yearly average.
  - f) Volume regulation: 20% of the daily average consumption.
  - g) Pressures: i) maximum:50.0m; ii) minimum:6.0m
4. Service levels:
- a) Criteria: INS only carries out housing connection programs for the concentrated population estimated at a 30% of the total rural population.
  - b) Coverage: Actual coverage 46%.
5. Entity/community participation:
- a) Kind of participation: The community offers labor and/or financial aid, representing an approximate total between 10% or 15% of the project cost.
  - b) Financial contribution: Yes. as indicated above, and up to a maximum of 40% of the total cost.
  - c) Process of operation and maintenance - level: Operation is carried out by the administrative Juntas with a very limited technical participation of the INS sectional ones.
  - d) Administration of systems: The system administration is carried out by administrative Juntas.
  - e) Water rates - type and coverage: Tariffs are calculated to cover the costs of AOyM, plus a very small depreciation reserve and an amortization up to 40% of the loan.

- f) Water rates/minimum wage: Approximately 5% of the minimum monthly wage.
- g) Community collection problems: Yes.
- h) Organization of community promotion: INS has 25 sectional offices in charge of community promotion and execution of works, very poorly staffed. At a central level, INS has a small section of community promotion.
6. Water quality - norms: INS has its own norms, which are being updated in order to simplify the designs.
7. Technology used in the programs: It has not been appropriate in some projects and in others very sophisticated treatment plants have been constructed. Generally speaking, technology is based on slow sand filters and PVC and cement asbest for pipes.
8. Selection criteria: The following criteria is used: a) population should be between 250 and 2,500; b) supply source; c) community participation and support, including disposition to form the administration Junta; d) economic efficiency.
9. Excreta disposal: For concentrated population, responsibility is on INS. The Ministry of Public Health carries out a latrine program through a different office of the INS.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)7, b)5, c)5, d)10, e)7, f)3, g)3, h)10, i)3, j)10, k)10, l)10, m)5

COUNTRY - COSTA RICA

1. National Plan of Rural Water Supply Yes.
- a) Scattered or concentrated population: Concentrated population up to 2000.
- b) Number of localities in the plan: 559 localities.
- c) Stages of execution: Two stages have been executed and the third one will soon be finished. A fourth stage is planned during the decade.
- d) Estimated cost in US\$: 20 million.
- e) Goals of population served in the decade:
- | GOALS/<br>DECADE                       | A R E A      |           |
|----------------------------------------|--------------|-----------|
|                                        | Concentrated | Dispersed |
| Water                                  | 100%         | 50%       |
| Sewerage<br>Septic Tanks<br>& Latrines | 0%           | 0%        |
|                                        | 100%         | 90%       |
- i) House connections:  
ii) Other means:
2. Responsible organization: Instituto Costarricense de Agua y Alcantarillado A y A. Dirección de Acueductos Rurales.
- a) Organization and personnel: Adequate design and personnel.
- b) Cost of programs, and local and external contributions:
- | Program | Millions of US\$ |          |
|---------|------------------|----------|
|         | Local            | External |
| BID I   | 3.5              | 1.3      |
| II      | 6.5              | -        |
| III     | 17.6             | -        |
- c) Regular program of operation and maintenance: There exists a regular program of Oym through AyA.
- d) Training program: There is a program on operation and plumbing at a central level. At a community level there is some elemental training.
- e) Areas of institutional weakness: i) financial autonomy; ii) organization; iii) training; iv) operation and maintenance.
3. Design criteria:
- a) Period: 20 years
- b) Projection of population, criteria: Double in 20 years. Rate 3.5%.

- c) Consumption: 150-250 l.p.p.pd.
  - d) Maximum day coefficient: 1.5 yearly average.
  - e) Maximum hour coefficient: 1.875 yearly average.
  - f) Volume regulation: i) gravity: 25%; ii) pumping: 50%.
  - g) Pressures: i) maximum = 70.0 m  
ii) minimum = 10.0 m.
4. Service levels:
- a) Criteria: Water supply through house connections, largely with meters. There are no standpipes.
  - b) Coverage: Total population = 929,000.  
i) metered connections: 604,000 - 65%; ii) connections 325,000 - 35%.
5. Entity/community participation:
- a) Kind of participation: AyA has two working methods: i) systems after construction are transferred to the communities; ii) administers the systems.
  - b) Financial contribution: There is no community aid. Since 1976, 90% is financed by the government and 10% by AyA.
  - c) Process of operation and maintenance - level: AyA operates 10% of the rural systems and 90% by the communities.
  - d) Administration of systems: The systems operated by AyA are administered by decentralized regional offices. Administrative committees are created in the community systems.
  - e) Water rates - type and coverage: AyA has a national tariff of \$3.76. The committees have tariffs that shift between \$1.80 and \$3.76. The rural tariffs are subsidized by the urban systems.
  - f) Water rates/minimum wage: It represents 1.26% of the monthly minimum wage.
  - g) Community collection problems: There are no serious billing problems.

- h) Organization of community promotion: AyA has a unit totally dedicated to the community promotion through social workers in 15 different regions of the country.
6. Water quality - norms: National norms.
7. Technology used in the programs: Appropriate. Simple designs of low cost and easy operation.
8. Selection criteria: a) population, b) condition of the source, c) concentration state of the population, d) interest and participation of the community, e) system type, f) cost per inhabitant.
9. Excreta disposal: The Ministry of Public Health has a program of septic tanks and latrines.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)4, b)3, c)7, d)6, e)8, f)5, g)5, h)5, i)6, j)4, k)9, l)9, m)8.

COUNTRY - DOMINICAN REPUBLIC

1. National Plan of Rural Water Supply      There is a national plan called PLANAR. The III stage is being executed.
- a) Scattered or concentrated population:      Concentrated from 200 to 2,000 pop.
- b) Number of localities in the plan:      620 localities.
- c) Stages of execution:      Two stages (III & IV) will be carried out in the decade.
- d) Estimated cost in US\$:      The total cost for the decade is estimated at US\$ 30 million.
- e) Goals of population served in the decade:
- i) House connections:      80,000 pop.
- ii) Other means:      Standpipes: 120,000 pop.
2. Responsible organization:      Instituto Nacional de Agua Potable y Alcantarillado, INAPA.
- a) Organization and personnel:      In order to carry out PLANAR, INAPA, who also takes care of the urban subsector, has created an executing agency with adequate personnel.
- b) Cost of programs, and local and external contributions:
- | Program    | Millions of US\$ |          |
|------------|------------------|----------|
|            | Government       | External |
| PLANAR I   | 1.3              | 2.0      |
| PLANAR II  | 2.6              | 4.1      |
| PLANAR III | 1.9              | 8.1      |
- c) Regular program of operation and maintenance:      Nonexistent.
- d) Training program:      Nonexistent.
- e) Areas of institutional weakness:      Operation and maintenance, training and organization.
3. Design criteria:
- a) Period:      20 years.
- b) Projection of population, criteria:      Arithmetic progression. Rate 3%.

- c) Consumption: 80- 100 l.p.p.d.
  - d) Maximum day coefficient: 1.2 of yearly average.
  - e) Maximum hour coefficient: 1.8 of yearly average.
  - f) Volume regulation: 25% maximum daily.
  - g) Pressures: i)maximum:50 m. ii)minimum:10.0 m.
4. Service levels:
- a) Criteria: Coverage: 40% for house connections and 60% for standpipes.
  - b) Coverage:
5. Entity/community participation:
- a) Kind of participation: The community supplies labor and some materials.
  - b) Financial contribution: No.
  - c) Process of operation and maintenance - level: At present, operation and maintenance is given by INAPA, but for the III stage, Juntas will be created.
  - d) Administration of systems: INAPA is in charge. Eventually it will go to the Juntas.
  - e) Water rates - type and coverage: A flat rate of US\$ 2.00 for monthly connection is applicable, but it does not cover AO&M costs.
  - f) Water rates/minimum wage: It represents 3% of the minimum monthly income.
  - g) Community collection problems: Yes, it exists.
  - h) Organization of community promotion: The community promotion work is done through the local INAPA offices which have social promoters. During the III stage, this work will go on even after finishing the construction work.
6. Water quality - norms: National norms.
7. Technology used in the programs: Appropriate. Simple systems, slow sand filters treatment plants, PVC pipes.



8. Selection criteria:

a) population between 400 and 3,500, b) standpipes, c) lack of water services, d) housing concentration, e) access, f) community willingness to pay, g) cost-efficiency.

9. Excreta disposal:

Ministry of Public Health.

10. Problems in the development of the programs:

a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates

a)5, b)5, c)5, d)3, e)5, f)9, g)7, h)10, i)0, j)5, k)10, l)10, m)5.

COUNTRY - ECUADOR

1. National Plan of Rural Water Supply

There is no national plan.

  - a) Scattered or concentrated population:  
Concentrated population up to 2,000.
  - b) Number of localities in the plan:  
Not established.
  - c) Stages of execution:  
Not established.
  - d) Estimated cost in US\$:  
Not established.
  - e) Goals of population served in the decade:
    - i) House connections:
    - ii) Other means:
2. Responsible organization:

Instituto Ecuatoriano de Obras Sanitarias, IEOS. División de Saneamiento Ambiental.

  - a) Organization and personnel:  
IEOS is in the process of reorganization so as to be able to take care of the decade's needs.
  - b) Cost of programs, and local and external contributions:  
The investments made up to date were financed with government contributions.
  - c) Regular program of operation and maintenance:  
IEOS does not have a regular program of OyM. A Dirección Nacional de OyM was created in 1980.
  - d) Training program:  
It does not have a training program.
  - e) Areas of institutional weakness:  
i) organization, ii) planning, iii) operation and maintenance, iv) training.
3. Design criteria:
  - a) Period:  
20 to 30 years.
  - b) Projection of population, criteria:  
Comparison between several methods.
  - c) Consumption:  
Per capita consumption figures are in accordance with the climate: i) cold: 30 l.p.p.d; ii) mild:40 l.p.p.d.; iii) hot:50 l.p.p.d.

- d) Maximum day coefficient: 1.3. to 1.5 of yearly average.
  - e) Maximum hour coefficient: 2.0 - 2.3 of yearly average.
  - f) Volume regulation: 35% of daily yearly average.
  - g) Pressures: i) maximum: 50.00m. ii) minimum: 10.00m.
4. Service levels:
- a) Criteria: IEOS designs the systems to provide house connections to 60% of the population, the rest is supplied by standpipes.
  - b) Coverage:
5. Entity/community participation:
- a) Kind of participation: Generally 20% of the cost is provided by the community, in labor. The rest is provided by the municipalities.
  - b) Financial contribution: No financial contribution is provided by the communities.
  - c) Process of operation and maintenance - level: The administrative Juntas are in charge of OyM. Advice is eventually given by IEOS through its social workers.
  - d) Administration of systems: Through the administrative Juntas.
  - e) Water rates - type and coverage: Tariffs are calculated at a system level to cover AOyM.
  - f) Water rates/minimum wage: Approximately 3% of the minimum monthly wage.
  - g) Community collection problems: No problems.
  - h) Organization of community promotion: IEOS has a department of promotion and sanitary education at central level, with one chief and five promoters.
6. Water quality - norms: There are provisional design norms that incorporate water quality criteria (OPS/OMS).
7. Technology used in the programs: Not considered appropriate, very sophisticated and very expensive systems have been constructed.

8. Selection criteria:

No methodology for the community selection.

9. Excreta disposal:

The División de Saneamiento Ambiental has a rural basic health direction that takes care of latrines.

10. Problems in the development of the programs:

a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates

a)5, b)10, c)7, d)10, e)10, f)5, g)5, h)10, i)10, j)10, k)10, l)10, m)5.

COUNTRY - EL SALVADOR

1. National Plan of Rural Water Supply

Yes, there is a basic rural National Health Plan: water and latrines.

a) Scattered or concentrated population:

It takes care of the scattered and concentrated population, i) concentrated (60%): water and latrines; ii) scattered: standpoints, house filters and latrines.

b) Number of localities in the plan:

1981-1990 - 400 localities.

c) Stages of execution:

2 stages are planned for the decade:

I 1981-1984 200 localities.  
II 1985-1990 200 localities.

d) Estimated cost in US\$:

i) I stage = \$16 million  
ii) II stage = \$16 million

e) Goals of population served in the decade:

Total pop.: 400,000.

i) House connections:

Connections: 320,000 pop.

ii) Other means:

Standpipes: 80,000 pop.

2. Responsible organization:

PLANSABAR Executing Unit, Ministry of Public Health.

a) Organization and personnel:

Adequate structure and personnel.

b) Cost of programs, and local and external contributions:

| Program       | Millions US\$ |          |
|---------------|---------------|----------|
|               | Local         | External |
| BID I         | 1.6           | 1.5      |
| CIDA          | -             | 1.1      |
| BID II        | 2.7           | 3.6      |
| PNUD y UNICEF | .06           | .04      |

c) Regular program of operation and maintenance:

Yes, there is a corrective program.

d) Training program:

There is a training program at a regional and central level.

e) Areas of institutional weakness:

i) administration; ii) personnel.

3. Design criteria:

a) Period:

20 years.

- b) Projection of population, criteria: Arithmetic progression: 3% yearly.
  - c) Consumption: Connections: 100 l.p.p.d.  
Standpipes: 30 l.p.p.d.
  - d) Maximum day coefficient: 1.2 yearly average.
  - e) Maximum hour coefficient: 2.0 yearly average.
  - f) Volume regulation: 30% - 40% maximum daily.
  - g) Pressures: i) maximum: 60.0 m; ii) minimum: 4.0 m.
4. Service levels:
- a) Criteria:
  - b) Coverage: PLANSABAR is planning to install house connections to 60% of the population; the rest is supplied by standpipes.
5. Entity/community participation:
- a) Kind of participation: Labor, local materials and contributions up to 20% of the work cost are provided by the community.
  - b) Financial contribution: Between 5% and 10% of cost is provided by the community.
  - c) Process of operation and maintenance - level: O&M is made by the executive unit at a central level, and on a regional level by a maintenance unit.
  - d) Administration of systems: By the administrative Juntas.
  - e) Water rates - type and coverage: Tariffs are designed to cover the operative costs and are calculated for each system. They vary between US\$ 0.2 y US\$ 2.0 by monthly subscriber.
  - f) Water rates/minimum wage: 45% as maximum of the daily minimum wage.
  - g) Community collection problems: Yes, there is.
  - h) Organization of community promotion: The promotion section at a central level has one chief who directs 4 supervisors and 25 promoters who work at a regional level.
6. Water quality - norms: OPS/OMS norms are applicable.

7. Technology used in the programs: It is considered appropriate, with simple designs, PVC pipes. The majority of the systems are supplied by pumping.
8. Selection criteria: a) national and regional development plans, b) source of water, c) population concentration without services, d) community interest and willingness to contribute, e) access, f) cost-efficiency.
9. Excreta disposal: Since 1980 PLANSABAR has been assigned the latrine program.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)5, b)5, c)5, d)3, e)8, f)8, g)6, h)10, i)5, j)5, k)10, l)10, m)10.

COUNTRY - GUATEMALA

1. National Plan of Rural Water Supply

There is a national plan, even though it is not officially accepted.

a) Scattered or concentrated population:

Concentrated population up to 2,000.

b) Number of localities in the plan:

In the decade, it is planned to serve 800 localities.

c) Stages of execution:

Two stages will be executed in the decade.

d) Estimated cost in US\$:

The total cost for the decade is estimated at US\$ 40 million.

e) Goals of population served in the decade:

Total population: 800,000.

i) House connections:

320,000 pop.

ii) Other means:

Standpipes: 480,000 pop.

2. Responsible organization:

Executing unit (UNEPAR).

a) Organization and personnel:

Adequate structure of the unit and personnel.

b) Cost of programs, and local and external contributions:

| Program | Millions US\$ |          |
|---------|---------------|----------|
|         | Local         | External |
| BID I   | 0.8           | 1.3      |
| BID II  | 1.3           | 2.7      |
| BID III | 3.6           | 7.0      |

c) Regular program of operation and maintenance:

Yes, there is one. Last yearly budget \$221,000. UNEPAR plans to delegate the O&M to administrative Juntas supervised by 3 regional offices.

d) Training program:

There are some training programs for promoters, topographers and O&M for the local Juntas.

e) Areas of institutional weakness:

Insufficient personnel due to the lack of incentives, transport, budget.

3. Design criteria:

a) Period:

20 years



- b) Projection of population, criteria: Geometric progression at a rate of 2%.
  - c) Consumption: i) house connections 60-90 l.p.p.d.; ii) standpipes 40 l.p.p.d.
  - d) Maximum day coefficient: 1.2 yearly average.
  - e) Maximum hour coefficient: 1.8 yearly average.
  - f) Volume regulation: 25% daily yearly average.
  - g) Pressures: i) maximum: 40 m. ii) minimum 6 m.
4. Service levels:
- a) Criteria: The majority of the population is supplied by standpipes.
  - b) Coverage: Total population: 798,000; i) connections: 175,000 pop. - 22%; ii) meter connections: 3,100 pop.; iii) standpipes: 620,000 - 78%.
5. Entity/community participation:
- a) Kind of participation: Labor representing between 4% and 25% of the work cost is contributed by the community.
  - b) Financial contribution: There is no financial contribution. Only the source of water, unskilled labor and local materials are supplied.
  - c) Process of operation and maintenance - level: Operation and maintenance is carried out by UNEPAR.
  - d) Administration of systems: There are local Juntas, but the responsibility is UNEPAR's.
  - e) Water rates - type and coverage: They are calculated for each system so as to cover AO&M.
  - f) Water rates/minimum wage: 20-40% daily wage.
  - g) Community collection problems: Yes, there are. Especially administrative.

- h) Organization of community promotion:
- The country is divided in 20 sectors, each one with a communal promotor; there is a supervisor in the 3 regional offices and at the central level, the system has someone in charge.
6. Water quality - norms: UNEPAR norms.
7. Technology used in the programs: Appropriate. Gravity sources with PVC pipes, no meters are used. Simple design system.
8. Selection criteria: a) minimum population of 400; b) supply sources; c) access; d) community interest; e) cost-efficiency.
9. Excreta disposal: UNEPAR does not carry out latrine programs. It is carried out by the División de Saneamiento Ambiental of the Ministry of Public Health.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)2, b)3, c)6, d)3, e)5, f)4, g)3, h),10, i)4, j)6, k)7, l)6, m)5.

COUNTRY - HONDURAS

1. National Plan of Rural Water Supply Nonexistent. Nevertheless, since 1967 programs with the help of AID, CARE and IDB have been carried out.
- a) Scattered or concentrated population: Concentrated population between 200 and 2,000.
  - b) Number of localities in the plan: 855 communities in the decade will be served.
  - c) Stages of execution: Two stages.
  - d) Estimated cost in US\$: The total cost for the decade is estimated at US\$ 35 million.
  - e) Goals of population served in the decade:
    - i) House connections: Connected population: 600,000 - 80%.
    - ii) Other means: N/A
2. Responsible organization: Servicio Autónomo Nacional de Acueductos y Alcantarillados (SANAA).
- a) Organization and personnel: An executive unit with appropriate personnel was created.
  - b) Cost of programs, and local and external contributions:

| Program    | Millions US\$ |      |          |
|------------|---------------|------|----------|
|            | Com.          | Gov. | External |
| SANAA-BID  | .4            | 1.4  | 2.8      |
| SANAA-CARE | 1.5           | 3.5  | 2.0      |
| SANAA-AID  | .8            | .8   | 2.9      |
  - c) Regular program of operation and maintenance: Nonexistent. The systems are operated by administrative Juntas. SANAA has 4 regional offices.
  - d) Training program: A training unit exists at central level. Plumbing courses are offered.
  - e) Areas of institutional weakness: Administration, commercial maintenance and training.
3. Design criteria:
- a) Period: 20 years.
  - b) Projection of population, criteria: Arithmetic progression: rate of 3-3.5%.

| c) Consumption:                                     | <table><thead><tr><th><u>Population</u></th><th><u>L.P.P.D.</u></th></tr></thead><tbody><tr><td>200- 500</td><td>57</td></tr><tr><td>501- 100</td><td>58 - 76</td></tr><tr><td>1,001-2,000</td><td>77 - 114</td></tr></tbody></table> | <u>Population</u> | <u>L.P.P.D.</u> | 200- 500 | 57 | 501- 100 | 58 - 76 | 1,001-2,000 | 77 - 114 |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|----------|----|----------|---------|-------------|----------|
| <u>Population</u>                                   | <u>L.P.P.D.</u>                                                                                                                                                                                                                       |                   |                 |          |    |          |         |             |          |
| 200- 500                                            | 57                                                                                                                                                                                                                                    |                   |                 |          |    |          |         |             |          |
| 501- 100                                            | 58 - 76                                                                                                                                                                                                                               |                   |                 |          |    |          |         |             |          |
| 1,001-2,000                                         | 77 - 114                                                                                                                                                                                                                              |                   |                 |          |    |          |         |             |          |
| d) Maximum <u>day</u> coefficient:                  | 1.35 yearly average.                                                                                                                                                                                                                  |                   |                 |          |    |          |         |             |          |
| e) Maximum <u>hour</u> coefficient:                 | 2.00 yearly average.                                                                                                                                                                                                                  |                   |                 |          |    |          |         |             |          |
| f) Volume regulation:                               | 30% daily maximum.                                                                                                                                                                                                                    |                   |                 |          |    |          |         |             |          |
| g) Pressures:                                       | i) maximum: 50 m. ii) minimum 10 m.                                                                                                                                                                                                   |                   |                 |          |    |          |         |             |          |
| 4. <u>Service levels:</u>                           | Only house connections.                                                                                                                                                                                                               |                   |                 |          |    |          |         |             |          |
| a) Criteria:                                        | Total population: 358,000.                                                                                                                                                                                                            |                   |                 |          |    |          |         |             |          |
| b) Coverage:                                        | Population with connections:<br>189,500. Percentage: 53%.                                                                                                                                                                             |                   |                 |          |    |          |         |             |          |
| 5. <u>Entity/community participation:</u>           |                                                                                                                                                                                                                                       |                   |                 |          |    |          |         |             |          |
| a) Kind of participation:                           | Government: 80%, community: 20%.<br>Community: labor and local<br>material, eventually money.                                                                                                                                         |                   |                 |          |    |          |         |             |          |
| b) Financial contribution:                          | Eventually.                                                                                                                                                                                                                           |                   |                 |          |    |          |         |             |          |
| c) Process of operation and<br>maintenance - level: | O&M is in charge of the adminis-<br>trative Juntas; supervision by<br>SANAA.                                                                                                                                                          |                   |                 |          |    |          |         |             |          |
| d) Administration of systems:                       | Administrative Juntas.                                                                                                                                                                                                                |                   |                 |          |    |          |         |             |          |
| e) Water rates - type and coverage:                 | Plain national tariff, US\$ 1.25/<br>connection. It covers AO&M.                                                                                                                                                                      |                   |                 |          |    |          |         |             |          |
| f) Water rates/minimum wage:                        | 47% daily wage.                                                                                                                                                                                                                       |                   |                 |          |    |          |         |             |          |
| g) Community collection problems:                   | Yes, there are. 30% do not pay<br>because of lack of promotion.                                                                                                                                                                       |                   |                 |          |    |          |         |             |          |
| h) Organization of community<br>promotion:          | Unit of community promotion: One<br>chief and 5 promoters, US\$5000/<br>year.                                                                                                                                                         |                   |                 |          |    |          |         |             |          |
| 6. <u>Water quality - norms:</u>                    | National norms.                                                                                                                                                                                                                       |                   |                 |          |    |          |         |             |          |
| 7. <u>Technology used in the programs:</u>          | Appropriate. Extensive use of<br>labor. Simple designs, treatment<br>modular plants with slow sand<br>filters. PVC pipes.                                                                                                             |                   |                 |          |    |          |         |             |          |

8. Selection criteria:

a) national development plan; b) national health plan; c) access; d) water source; e) gravity supply; f) community interest, contribution, acceptance of AO&M; g) cost-efficiency.

9. Excreta disposal:

SANNA does not have a latrine program. The Ministry of Public Health carries out the latrine program called PASAR.

10. Problems in the development of the programs:

a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates

a)3, b)2, c)6, d)2, e)4, f)2, g)5, h)3, i)2, j)6, k)4, l)6, m)5.

COUNTRY - MEXICO

1. National Plan of Rural Water Supply Does not exist. There are some partial programs.
  - a) Scattered or concentrated population: N/A
  - b) Number of localities in the plan: N/A
  - c) Stages of execution: N/A
  - d) Estimated cost in US\$: N/A
  - e) Goals of population served in the decade: N/A
    - i) House connections: N/A
    - ii) Other means: N/A
  
2. Responsible organization: Secretaría de Asentamientos Humanos y Obras Públicas.
  - a) Organization and personnel: Adequate.
  - b) Cost of programs, and local and external contributions:
 

|             | US\$ MILLIONS |          |
|-------------|---------------|----------|
| Program     | Government    | External |
| PIDER-BID I | 1.6           | 5.4      |
  - c) Regular program of operation and maintenance: Regular program nonexistent.
  - d) Training program: Nonexistent.
  - e) Areas of institutional weakness: Maintenance and training
  
3. Design criteria:
  - a) Period: 20 years:
  - b) Projection of population, criteria: Arithmetic projection 3%
  - c) Consumption: 75 l.p.p.d.
  - d) Maximum day coefficient: 1.2 - 1.5 yearly average
  - e) Maximum hour coefficient: 1.5 - 2.0 yearly average
  - f) Volume regulation: 15% daily average

- g) Pressures: i) maximum: 40.0 m, ii) minimum: 10.0 m.
4. Service levels:
- a) Criteria: Water supply is provided only through connections.
- b) Coverage: Total population: 28.6 million; population with connections: 7.9 million: 28%.
5. Entity/community participation:
- a) Kind of participation: It is not established and it is variable. Approximately 20% in labor, materials and eventually in money.
- b) Financial contribution: Eventually.
- c) Process of operation and maintenance - level: It is done at a central level.
- d) Administration of systems: Community entities are being organized to take responsibility for the programs.
- e) Water rates - type and coverage: The rates do not cover AO&M costs. Rates vary between \$0.2 and \$1.70 per connection per month.
- f) Water rates/minimum wage: Generally the rate represents 20% of the daily minimum wage.
- g) Community collection problems: There are billing problems.
- h) Organization of community promotion: There is no organization for this purpose.
6. Water quality - norms: National norms.
7. Technology used in the programs: Adequate to the socioeconomic conditions of the entities. Simple designs.

8. Selection criteria:

The Secretaría de Asentamientos Humanos y Obras Públicas is the one to determine the socioeconomic development of the municipalities and its correlation with the federal entities, depending upon their development. In addition, the cost is taken into account.

9. Excreta disposal:

There is no definite policy regarding this.

10. Problems in the development of the programs:

a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates

a)0, b)3, c)3, d)0, e)4, f)8, g)7, h)4, i)4, j)7, k)8, l)7, m)10.



COUNTRY - NICARAGUA

1. National Plan of Rural Water Supply

There is no national plan. Nevertheless, there have been several programs.

a) Scattered or concentrated population:

Concentrated population between 240 to 2,000.

b) Number of localities in the plan:

It is planned, in this decade, to serve 320 localities.

c) Stages of execution:

Two stages will be executed during the decade.

d) Estimated cost in US\$:

US\$ 18.0 million.

e) Goals of population served in the decade:

Population of 200,000.

i) House connections:

House connections: 60%.

ii) Other means:

Standpipes: 40%.

2. Responsible organization:

Instituto Nacional de Agua y Alcantarillado (INAA).

a) Organization and personnel:

INAA is an entity that emerged recently from Aguadora de Managua and DENACAL. It is in the process of organization.

b) Cost of programs, and local and external contributions:

| Program | Millions of US\$              |          |
|---------|-------------------------------|----------|
|         | Local                         | External |
| BID I   | 2.1                           | 2.0      |
| BID II  | 0.2                           | 0.3      |
| BID III | 0.7                           | 2.7      |
| BIRF    | In execution, no investments. |          |
| AID     | 0.5                           | 0.8      |
| CARE    | 0.06                          | 0.14     |

c) Regular program of operation and maintenance:

There is no O&M program. An O&M office has been created at INAA.

d) Training program:

There is no regular program. Nevertheless, goals have been set for the decade.

e) Areas of institutional weakness:

i) organization; ii) operation and maintenance; iii) training.

3. Design criteria:

a) Period:

20 years.

- b) Projection of population, criteria: Arithmetic progression. Rates between 2.5 and 4.0%.
- c) Consumption: 75 l.p.p.d.
- d) Maximum day coefficient: 1.5 yearly average.
- e) Maximum hour coefficient: 2.5 yearly average.
- f) Volume regulation: 15% maximum daily volume.
- g) Pressures: i) maximum:50.00m. ii) minimum: 8.00m.

4. Service levels:

- a) Criteria: For communities of 500 to 2,000 pop., house connections are used. For communities of less than 500 pop., standpipes are used.
- b) Coverage:

|                                |                  |
|--------------------------------|------------------|
| <u>Concentrated population</u> | 186,000          |
| i) connections                 | 76,000           |
| ii) connections with meters    | 51,000           |
| iii) standpipes                | 13,000           |
|                                | <u>140,000</u>   |
| <u>Dispersed population</u>    | 1,106,000        |
| Total                          | <u>1,292,000</u> |

5. Entity/community participation:

- a) Kind of participation: Labor, local materials, land, right of way, eventual objective 15-25% of national contribution.
- b) Financial contribution: Eventually 5-10% of national contribution.
- c) Process of operation and maintenance - level: INAA is in charge of operation and maintenance through its regional offices.
- d) Administration of systems: INAA is in charge of the system administration.
- e) Water rates - type and coverage: National rate of \$1.60 for monthly connection.
- f) Water rates/minimum wage: Approximately 1.3% of the monthly minimum wage.
- g) Community collection problems: It is not a major problem. 90% of the charges are collected.

- h) Organization of community promotion: In its organization stage.
6. Water quality - norms: There are no national norms, OPS/OMS norms are used.
7. Technology used in the programs: Appropriate. Simple designs in accordance with the socioeconomic conditions of the communities.
8. Selection criteria:  
a) population between 200 and 2,000;  
b) coverage; c) source of supply;  
d) concentration state of houses;  
e) community interest and contribution; f) access; g) AO&M cost;  
h) level of employment; i) cost-efficiency.
9. Excreta disposal: The Ministry of Public Health is in charge of this, and it is planned to provide a population of 1.2 million with latrines.
10. Problems in the development of the programs:  
a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates  
a)5, b)8, c)7, d)2 e)7, f)3, g)3, h)10, i)1, j)10, k)7, l)7, m)5.

COUNTRY - PANAMA

1. National Plan of Rural Water Supply Yes, there is one.
- a) Scattered or concentrated population: Only the concentrated population between 500 and 2,000.
  - b) Number of localities in the plan: The last plan for 32 localities will be executed during the decade.
  - c) Stages of execution: One stage.
  - d) Estimated cost in US\$: US\$ 6.3 million.
  - e) Goals of population served in the decade: The goal is to complete 100% of coverage for the rural concentrated population. The Ministry of Health takes care of the dispersed population through yearly hand pump programs and small water sources (50 per year).
    - i) House connections: The population to be served through house connections without meter is 66,000.
    - ii) Other means:
2. Responsible organization: Instituto de Acueductos y Alcantarillados Nacionales, IDAAN for towns between 500 and 2,000 pop. The Ministry of Public Health for the dispersed population.
- a) Organization and personnel: IDAAN has the adequate organization and personnel.
  - b) Cost of programs, and local and external contributions:

|         | Millions of US\$ |            |          |
|---------|------------------|------------|----------|
| Program | Comun.           | Government | External |
| IDAAN   | 0.2              | 1.1        | -        |
| BID I   | 0.3              | 0.88       | 0.4      |
| BID II  | 0.3              | 0.9        | 1.9      |
  - c) Regular program of operation and maintenance: IDAAN has an office of Operation and Maintenance that is in charge of the direct operation of the water systems.
  - d) Training program: There is a training program at a central level.
  - e) Areas of institutional weakness: Operation and maintenance, rates and community promotion.

3. Design criteria:

- a) Period: 20 years.
- b) Projection of population, criteria: Geometric progression. Rate of 2.4%.
- c) Consumption: Consumption of 110 l.p.p.d.
- d) Maximum day coefficient: 1.15 yearly average.
- e) Maximum hour coefficient: 1.75 yearly average.
- f) Volume regulation: 33% maximum daily usage.
- g) Pressures: i) maximum: 56.0 m; ii) minimum 7.0 m.

4. Service levels:

- a) Criteria: Water supply is done only through house connection without meter.
- b) Coverage: Total population to be taken care of: 66,000; connections: 66,000 pop., percentage: 100%.

5. Entity/community participation:

- a) Kind of participation: The community supplies labor, local materials and eventually, renting of equipment, and is estimated between 18% to 20% of the total cost.
- b) Financial contribution: In general, there is no financial contribution by the communities.
- c) Process of operation and maintenance - level: The systems constructed by IDAAN are administered by them.
- d) Administration of systems: The administration of the systems is done by IDAAN.
- e) Water rates - type and coverage: There is only one national tariff of US\$ 2.50 for monthly connection.
- f) Water rates/minimum wage: The tariff represents between 2.5% and 3% of the minimum monthly wage.
- g) Community collection problems: Yes, there are.

- h) Organization of community promotion: IDAAN does not have a promotion unit.
6. Water quality - norms: National norms.
7. Technology used in the programs: Appropriate to socioeconomic and cultural conditions. PVC pipes and simple designs.
8. Selection criteria: a) population between 500 and 2,000; b) population concentration; c) source of supply; d) community interest and contribution; d) access; e) cost-benefit.
9. Excreta disposal: The Ministry of Public Health is in charge and it has a latrine program in execution.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)1, b)2, c)3, d)1, e)3, f)5, g)n/a, h)4, i)3, j)1, k)3, l)5, m)5.

COUNTRY - PARAGUAY

1. National Plan of Rural Water Supply

Does not exist. A very recent plan initiated by SENASA in 1979 is carried out.

  - a) Scattered or concentrated population: Concentrated population of level I from 500-4000; level II from 150-500 and dispersed population.
  - b) Number of localities in the plan: The program for concentrated population level I comprises 186 communities; for level II, 1300 communities. No defined goals are set for the dispersed population.
  - c) Stages of execution: Not defined.
  - d) Estimated cost in US\$: US\$54.0 million.
  - e) Goals of population served in the decade:
    - i) House connections: Concentrated: 220,000 pop.
    - ii) Other means: Dispersed: 600,000 pop.
  
2. Responsible organization:

Servicio Nacional de Saneamiento Ambiental, SENASA.

  - a) Organization and personnel: Adequate: 34 professional, 2,500 technicians and 50 laborers.
  - b) Cost of programs, and local and external contributions:
 

|                | <u>Millions of US\$</u> |             |                 |
|----------------|-------------------------|-------------|-----------------|
| <u>Program</u> | <u>Comun.</u>           | <u>Gov.</u> | <u>External</u> |
| BIRF I         | 1.8                     | 3.2         | 6.0             |
  - c) Regular program of operation and maintenance: There is an operation and maintenance program in charge of the Juntas backed up by the O&M department at a SENASA central level.
  - d) Training program: There is a modest program for health inspectors and assistants.
  - e) Areas of institutional weakness: Administrative-financial area, salaries, training, operation and maintenance.
  
3. Design criteria:
  - a) Period: 20 years.
  - b) Projection of population, criteria: Geometric progression. Rates between 2.6 and 2.7%.

- c) Consumption:
    - i) 501-4000 pop.: 100-130 l.p.p.d.,
    - ii) 50- 500 pop.: 80-100 l.p.p.d.
  - d) Maximum day coefficient: 1.2 yearly average.
  - e) Maximum hour coefficient: 1.8 yearly average.
  - f) Volume regulation: 15-35% maximum daily.
  - g) Pressures:
    - i) maximum: 35.0 m;
    - ii) minimum 8.0 m.
4. Service levels:
- a) Criteria: To provide connections by the year 1990 for 180,000 pop. To initiate a program for the dispersed population that is estimated at 350,000.
  - b) Coverage: Total pop.: 180,000. House connections: 160,000 pop. Standpipes: 20,000 pop.
5. Entity/community participation:
- a) Kind of participation: The community participates with labor, materials and/or money. 10% minimum of total cost.
  - b) Financial contribution: Yes. it is determined based on socioeconomic studies. It varies between 10 - 30% and constitutes a revolving fund.
  - c) Process of operation and maintenance - level: Mixed. i) Juntas in charge of: administration; ii) SENASA: electro-mechanic equipment and central level accounting.
  - d) Administration of systems: In charge of the Juntas with advise from SENASA.
  - e) Water rates - type and coverage: The rate, for each system, is calculated by SENASA and includes: AO&M, mobil equipment depreciation and credit payment in 20 years.
  - f) Water rates/minimum wage: Tries not to surpass one daily wage.
  - g) Community collection problems: There is no experience because it is a very recent program.



- h) Organization of community promotion: Departamento de Promoción Comunal SENASA, with 2 technicians at a central level.
6. Water quality - norms: There are no national norms. SENASA has adopted OPS/OMS norms.
7. Technology used in the programs: Appropriate, simple designs, PVC pipes, slow sand filters.
8. Selection criteria: There is no methodology, nevertheless, the following criteria is taken into account: a) size of the population; b) community organization; c) geographic situation; d) sources of supply.
9. Excreta disposal: SENASA carries out a national latrine program. It is estimated that 84.8% of the rural population have these facilities.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)5, b)5, c)5, d)5, e)7, f)3, g)3, h)9, i)10, j)8, k)5, l)6, m)4.

COUNTRY - PERU

1. National Plan of Rural Water Supply Yes, there is one. Plan Nacional de Acueductos Rurales (law No. 13997, in accordance with the Punta del Este Agreement).
- a) Scattered or concentrated population: Concentrated 400-2,000 pop.
- b) Number of localities in the plan: 2,317 localities in the decade.
- c) Stages of execution: Two stages will be carried out in the decade.
- d) Estimated cost in US\$: US\$ 60 million.
- e) Goals of population served in the decade:
- i) House connections: One million pop.
- ii) Other means: There is none.
2. Responsible organization: Dirección de Saneamiento Rural, (Public Health Ministry), DSR.
- a) Organization and personnel: Organization and personnel, at a central level, are adequate. The health technical offices at a regional level do not have adequate personnel.
- b) Cost of programs, and local and external contributions:
- |                | Millions of US\$ |             |                 |
|----------------|------------------|-------------|-----------------|
| <u>Program</u> | <u>Comun.</u>    | <u>Gov.</u> | <u>External</u> |
| UNICEF         | -                | -           | 0.22            |
| BID I          | 0.45             | 1.9         | 1.65            |
| BID II         | 1.30             | 3.6         | 3.56            |
| CARE           | -                | -           | 0.67            |
| BID III        | 1.45             | 7.0         | 4.70            |
- c) Regular program of operation and maintenance: It is non existent, and this has produced the deterioration of several systems. A rehabilitation program will be carried out.
- d) Training program: Yes, there is one, at a central level and administrative Juntas.
- e) Areas of institutional weakness: a) personnel, for lack of proper salary; b) operation and maintenance.

3. Design criteria:

- a) Period: 20 years.
- b) Projection of population, criteria: Arithmetic progression, rate: 1.93%.
- c) Consumption: 400-500 pop.: 60-80 l.p.p.d.  
501-1,000: 80-100 l.p.p.d.  
1,001-2,000: 100-150 l.p.p.d.
- d) Maximum day coefficient: 1.2 yearly average.
- e) Maximum hour coefficient: i)400-1000 pop.: 4.0 yearly average. ii)1001-2000 pop.:3.0 yearly average.
- f) Volume regulation: i) Ground level tanks: 25-30% yearly average. ii) elevated tanks: 15-20% yearly average.
- g) Pressures: i)maximum: 50.0 m. ii)minimum: 10.0 m.

4. Service levels:

- a) Criteria: Supply is done through house connections. Only a small percentage are carried out by standpipes.
- b) Coverage: Total pop.:1,200.00 pop.  
i) connections: 1,000,000 83%.  
ii) standpipes: 200,000 17%.

5. Entity/community participation:

- a) Kind of participation: The community supplies labor, local materials and money. This contribution is estimated at 16% of the total cost.
- b) Financial contribution: Yes, to complete 16%.
- c) Process of operation and maintenance - level: It is carried out at administrative Junta level with the limited supervision of technical health offices.
- d) Administration of systems: Administrative Juntas.
- e) Water rates - type and coverage: They are calculated for each system so as to cover AO&M.
- f) Water rates/minimum wage: It does not surpass a daily wage.

- g) Community collection problems: Yes, there is, due to the economic situation of the users.
- h) Organization of community promotion: In charge of the Departamento de Promoción de Comunidades (Div. Ejecución de Obras). Personnel: at a central level: 1 engineer, 3 health educators, 1 sociologist, 3 health technicians. At a community level there is one promoter for work and support from the health technical offices.
6. Water quality - norms: National norms.
7. Technology used in the programs: Appropriate. Simple systems, PVC pipes, slow sand filters treatment plants.
8. Selection criteria: a) technicians: Utmost utilization of resources to obtain higher benefits, b) socioeconomic: interest of inhabitants and authorities, community participation, not carrying out other works, community engagements for O&M - and tariffs.
9. Excreta disposal: DSR has under its responsibility sanitation programs for rural towns, and its actual coverage is 1% of the concentrated population up to 2,000 inhabitants. The Dirección de Saneamiento Ambiental of the Ministry of Public Health is in charge of the national latrine plan.
10. Problems in the development of the programs:
- a) design criteria, b) design preparation, c) work execution, d) utilized technology, e) entity organization, f) community motivation, g) community entities, h) external finance, i) local community contribution, j) local national contribution, k) operation and maintenance, l) training, m) water rates
- a)0, b)0, c)0 d)0, e)5, f)0, g)0, h)10, i)0, j)0, k)10, l)0, m)10.