

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA¹

David Donaldson, B.S.C.E., M.S.S.E., P.E.²

The proportion of rural people in Latin America with access to potable water rose dramatically during the last decade. While the unfinished task is vast, a solid foundation has been built. This article takes a detailed look at the current situation, explores a number of existing problems, and outlines several methods that offer considerable promise for the future.

Introduction

A Challenge Accepted

By signing the Charter of Punta del Este in 1961, the Governments of the Americas adopted the goal of supplying water and sewerage to at least 50 per cent of their rural population by the end of that decade. At the time they were set, these goals represented an unparalleled challenge, for only about 8 million rural dwellers (7 per cent of the total rural population) had adequate water supplies (13). To meet this challenge it was obvious that numerous rural water programs would have to be created and many tens of thousands of projects would have to be planned, designed, and built in order to bring water to the target population of 64 million people.

Further, it soon became evident that existing organizational concepts would have to be revised and that new skills would have to be sought for the revised programs. Thus the stage was set. Dostoevski might say of a similar moment, "taking a new step, uttering a new

word is what people fear most." But the step was taken.

Achievements to Date

Examining the progress that rural water programs of the Americas have made in the last ten years, one is struck first by the magnitude of the accomplishments and the promise they hold for the future; second, by the deep and growing concern for rural areas and a parallel intensification of efforts to promote modernization of rural life; and, third, by the vastness of the unfinished portion of the task.

Considering the progress made, the past decade should be viewed as one of solid achievement. The best data available (11, 13) show that by the end of 1972 the countries of the region had raised the proportion of rural dwellers having a potable water supply from about 7 to 27 per cent—thus increasing the population served by a factor of about 4.7. This means that about 33 million rural inhabitants are now being served by approximately 30,000 systems that they themselves helped national programs to build.

For several years now there has been an organized rural water program in every country of the region, largely because during the 1960's the Pan American Health Organization helped the countries to experiment and develop new concepts and solutions. While some of these programs achieved less than the desired results,

¹Background paper presented at the Seminar on Rural Water Supply and Sanitation in Developing Countries sponsored by the International Development Research Council (Lausanne, Switzerland, 27 May-5 June 1973). Also appearing in Spanish in *Boletín de la Oficina Sanitaria Panamericana*, Vol. LXXVI, No. 4 (April 1974).

²Sanitary Engineer, Pan American Health Organization.

each served to refine existing techniques and to increase understanding of existing problems.

It is also worth noting that those involved have had the experience of obtaining and disbursing US\$73.5 million from the 24 loans that international credit agencies made in this field between January 1961 and December 1972 (see Table 1). Realizing that for each loan there are national matching funds in the amount of 40 to 60 per cent of the loan, and that the Government often contributes 20 to 30 per cent more in construction grants and an additional amount for operational funds, it has been estimated that about \$400 million was invested in rural water programs between 1961 and the end of 1972. About 80 per cent of this has come from national sources.

While much remains to be done, a solid base has been laid. As in most development programs, the effort to date—that of building the foundations for future efforts—is not readily apparent to the casual observer. But those who

know where to look can see that many of the programs can be traced from national/PAHO/UNICEF demonstration efforts, through PAHO-assisted pilot programs, to full-scale national rural water programs.

The success achieved should not be measured only by the numbers of new consumers. Concepts and approaches changed; consciousness of the need to speed modernization of rural life developed; and a new awareness of what could be accomplished in the rural sector emerged. Many of the first programs had very limited goals—often seeking to develop little more than a series of individual community systems serving water from standpipes. But very quickly the success of these individual projects caused formation of national or regional programs in which the people served demanded more complex solutions (such as water piped to the patios of private dwellings) and showed a willingness to pay the cost. The time needed for this transformation has varied from country to

TABLE 1—International loans and matching funds for rural water supply and sewerage systems in Latin America, January 1961–December 1972 (U.S. dollars).

Country	Lending agency	Year	Loan	National matching funds
Argentina...	IDB	1965	5,000,000	5,000,000
	IDB	1971	12,000,000	13,000,000
Bolivia...	IDB	1968	1,800,000	1,675,000
Chile...	IDB	1964	2,500,000	2,500,000
Costa Rica	IDB	1965	1,300,000	1,000,000
Dominican Republic	IDB	1968	1,950,000	1,050,000
	IDB	1970	4,100,000	2,625,000
El Salvador	IDB	1961	1,000,000	420,000
	IDB	1964	1,060,000	480,000
	IDB	1972	1,500,000	800,000
Guatemala...	IDB	1966	1,300,000	800,000
	AID	1969	1,345,000	620,000
	IDB	1972	2,600,000	1,320,000
Guyana...	AID	1968	600,000	400,000
Haiti...	IDB	1969	50,000	—
Honduras...	AID	1963	1,050,000	—
Nicaragua	IDB	1968	2,000,000	1,330,000
Panama...	IDB	1967	1,160,000	607,000
	IDB	1972	3,750,000	1,950,000
Peru...	IDB	1964	1,650,000	1,450,000
	IDB	1967	3,135,000	4,044,000
	IDB	1970	2,700,000	1,300,000
Venezuela...	IDB	1962	10,000,000	10,000,000
	IDB	1965	10,000,000	10,000,000
Total			73,550,000	62,371,000



The hand pump—a key first step in the process.

country, but in nearly every case once the initial projects were installed the improvements inexorably evolved.

Hand pumps vs. piped connections. Here it is interesting to note a major difference between programs in this Hemisphere and those in other parts of the world. In many programs outside the Americas it is argued that water delivered from a house connection—which implies developing a program for collecting and distributing the water and for administering the resulting system—should be considered one of the advanced steps in the rural water supply process. Therefore, in many of these programs hand pumps are the immediate goal, with any type of piped water being a long-term objective.

While hand pumps have their place in our programs, and many thousands have been installed in the Americas, our assessment of the problem indicates that the best approach is that of piped water systems developed, built, and operated with strong local participation. We believe that, even with the very limited human and financial resources available, this approach is the quickest way to give the most water to the most people at the lowest cost.

“Rural water”—a dynamic process. While most programs in the Americas started by building systems that would supply safe water from public fountains, experience has shown that this was only the beginning of a process—

and that it was generally only a prelude to the next stage, i.e., systems that pipe water into users’ homes.

The time it takes to evolve from one stage to the next depends on many factors—local economic conditions, the type and intensity of promotional efforts, awareness of health benefits, etc. But the limited data available indicate that within about eight to ten years after their inauguration many of the early public fountain systems became “patio connection” systems—i.e. systems delivering piped water to single taps in the patios of about 80 per cent of the houses served.

Current Goals and Approaches

Rural Water Goals

In October 1972 the Ministers of Health of the Americas held their Third Special Meeting in Santiago, Chile. There, after reviewing progress to date, they developed the “Ten-Year Health Plan for the Americas,” which contained the goals for the 1970’s. With regard to rural water they set the following targets:

Provide water for 50 per cent of the rural population, or, as a minimum, reduce that population without service by 30 per cent.³

³Pan American Health Organization. *Ten-Year Health Plan for the Americas*. See Reference 2, p. 50.

They also indicated that the countries should

Utilize [the] techniques of "mass approach" and concepts of community self-help to provide water in rural areas and use . . . revolving funds to finance rural water supply programs.⁴

It was pointed out that

. . . there still are many, especially in the rural areas, who lack these essential services [water and sewerage] and who are equally entitled to have them. Our priority task is undoubtedly to devote special attention to those most in need, those who usually live in villages and on the outskirts of major cities. With this in view, we have established goals which we hope to achieve through the application of modern techniques, those which make it possible to speed up installations through improved use of domestic resources, foreign capital, and, what is most essential, active community participation.⁵

"Rural" and "Rurban" Programs

In reading about the rural water supply programs of Latin America, one often finds the statement that "27 per cent of the rural population had a safe source of water at the end of 1972." To properly understand this, one must be aware of several concepts and definitions. Among other things, one needs to identify the types of "rural" programs in Latin America.

There has been a tendency in the past to lump several different programs under this single heading. In reality, however, there have been at least three separate and distinct types of "rural" programs, consisting of (1) community well programs for dispersed populations; (2) rudimentary aqueduct programs for semi-concentrated populations; and (3) more advanced aqueduct programs for villages and other concentrated populations.

Usually, in referring to a "rural water program" the writer is talking about the third category, together with some rudimentary aqueducts, but one can never be sure. Furthermore, the official estimates of "rural" water

coverage are often based on arbitrary numbers or definitions. (In fact, even the definitions of "rural" vary from country to country, though the most common one used in referring to water supply in Latin America is any population concentrations of 2,500 persons or less) (6).

Proposed definitions. In order to avoid future problems, it is proposed that the generic name "rural water program" be dropped and that the following more descriptive names be used: (1) "individual source" program (for dispersed populations); (2) "rudimentary aqueduct" program (for semi-concentrated populations); and (3) "rurban" water program (for villages and other small but concentrated populations).

Rural sociologists have developed the term "rurban" by combining the words rural and urban (15). The term will be used hereafter to refer to those population centers (i.e., villages) that are located in areas where most of the people make their living from agriculture, forestry, hunting, fishing, or any combination of these pursuits.

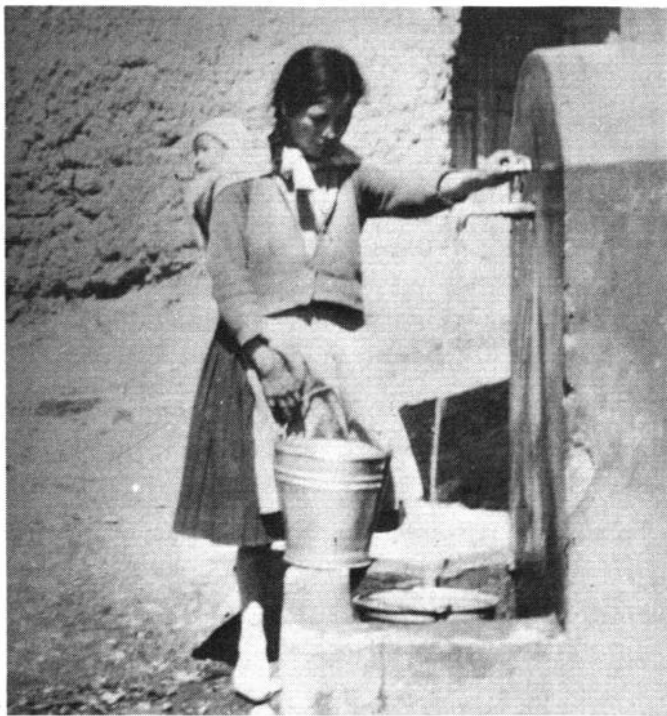
The three basic "rural" programs. The most basic program—an individual source program—involves developing a protected spring or providing a well with a hand pump to serve a number of scattered families. Little or no formal community structure is associated with its operation, and it is usually maintained and paid for by a national program or a ministry at no cost to the user.

The second program, that of rudimentary aqueducts, utilizes a well or spring, a small storage tank, and a limited distribution system for delivery of water to public fountains and perhaps a few patio connections in order to serve a semi-concentrated population. The users of such a system pay a small sum, but depend heavily on the national program to assist them in maintenance, operation, and future expansion.

The third program is the one most people are referring to when they talk about "rural water programs of the Americas." It is usually designed to serve a community with a "central

⁴*Ibid.*, p. 51.

⁵*Ibid.*, p. 7.



In time public fountains grow into patio connections.

core” of at least 100 houses and the immediate surrounding area. The system normally utilizes a protected spring, a pumped well, or a treatment plant, and delivers water to a storage tank. Its distribution system is designed to supply water through “house” or “patio” connections, making minimal use of public fountains. A local water board—with the assistance

of the national program—operates, maintains, and administers the system and collects water rates. Characteristics of the three programs are summarized in Table 2.

Clearly, each of the three programs is part of an interrelated process. The community wells serve to attract the surrounding people, and with time the nearby population density grows. When the density gets high enough, a rudimentary aqueduct can be considered. In the past the changeover from well to rudimentary aqueduct took an average of 12-15 years, while the next step—from public fountains to about 80 per cent patio connections—took an average of eight to ten years. Though this gives some idea of what to expect, it is felt that progress from one stage to the next could be speeded greatly if coordinated efforts for individual sources, rudimentary aqueducts, and rural systems were to replace the independent rural programs we have often had in the past.

• • •

At this point a logical question is why did the programs start with the concentrated instead of the dispersed population? The answer is dealing with more concentrated groups pro-

TABLE 2—Characteristics of different rural programs.

Type of Program	Population served	Source	Distribution systems	Water delivery	Local organization	Financial recovery
Individual source	Dispersed	Well or protected spring	None	At well only	None	None
Rudimentary aqueduct	Semiconcentrated	Pumped well or protected spring	Simple	At public fountains plus a few patio connections	Minor, mainly for operation and maintenance of system	Little or none
Rurban	Concentrated around a 500-person core	Well, spring, or treatment plant	Complex, serving core area plus nearby concentrated areas	At patio connections and a few public fountains	Major, for operation, maintenance, and administration of system and collection of rates	Enough to pay for operation, maintenance and local administration of system and to setup a reserve fund

duces the greatest public benefits and the quickest financial returns. Thus the countries of this region have elected to concentrate their efforts in the "rurban" area while carrying out the "individual source" programs at a slower rate.

The work in this second area has been slow for many reasons. Among them are: complexity of the problem; high unit cost of benefits received; and lack of human and technical resources. But as the problem of the concentrated population approaches a solution (in some rurban programs coverage is now up to 50 per cent of the target population) more attention must be given to solving the problems of the dispersed areas.

The Rurban Water Program

Despite differences of scale and technique, the various rurban programs of the Americas have much in common. For instance, they have all been based on three fundamental concepts. These are: (1) strong and active community participation in the development, construction, administration, and financing of the local systems; (2) focusing of resources on the problems of concentrated instead of dispersed populations; and (3) extensive use of technicians to assist a limited number of professional personnel. Other common features include the criteria used to select target communities, the methods used to finance projects, the widespread use of "mass approach" techniques, and the use of local boards which administer and operate the systems.

Community selection criteria. The criteria for selecting target communities and scheduling the construction of systems are determined at the national or regional level after a review of existing manpower and financial constraints.

Table 3 shows the criteria used by one of the more successful programs to choose those communities that would be included in its construction program. In practice, the criteria were not applied in a rigid manner but were used as guidelines. It was later found that selections made in the "project identification" phase were adhered to about 70 per cent of the time. Failure to meet the third and fifth criteria was found to be the main reason for removing communities from the list.

Program financing. The construction cost of the system has usually been broken down as follows: (1) about 50 per cent is covered by a loan from an international agency, which is often repaid by the Central Government; (2) about 30 per cent is granted by the national and state programs; and (3) the remaining 20 per cent is obtained from the community in the form of cash, materials, and labor during construction.

In general, the operating and administrative costs are paid by the community, together with an additional amount which can serve as a reserve or help amortize loan costs. These revenues are obtained through water rates collected by the local water board under the direction of the national program. The basic financial responsibility is thus a local one, but it is carefully watched, supervised, and coordinated by the national program, which carries

TABLE 3—Criteria for selection of target communities.

No. 1—Communities with largest number of inhabitants (not more than 2,000)
No. 2—Communities with access by road for trucks
No. 3—Communities that have expressed interest, have requested the system, and have offered financial or other assistance for construction and operation of the proposed system
No. 4—Communities located within one of the zones of influence of the national or local development plan
No. 5—Communities where the project can avoid unusual or expensive solutions

out financial planning for the program as a whole.

Program structure. Table 4 shows a typical program structure and the major areas of responsibility at each level. Regional programs, which exist in a few countries, are usually organized as separate operations, but are tied together under the "umbrella" of the national program through common criteria, designs, and techniques.

The revolving fund. In order to implement techniques which will permit low-cost solutions, it is necessary to establish sound *long-range* financing for rural water programs. The revolving fund appears to offer the best possibilities in this regard, because of its flexibility and its adaptability to local conditions. However, it should be noted that the term "revolving fund" has often been misused. A formal definition would be: A fund that is continually replenished as it is used, either through further appropriation or by income generated by the activity that it finances.

In terms of rural water programs, a revolving fund implies establishment of a fund on a regional or national level to finance construction of individual community projects. The loaned funds are recovered by having the

benefited community repay the revolving fund. As the repayments come in they are reloaned to finance additional projects (see Figure 1). An advantage of the technique is that methods for obtaining the original financing, terms of the loans, and terms of the repayments can be adapted to local conditions. To assist the Governments of the Americas in developing this approach, a document entitled *The Establishment and Operation of Revolving Funds* (Pan American Health Organization, 1969) has been written and distributed throughout the Region.

While the style of the revolving funds used has varied from place to place in Latin America, the fact they require a repayment scheme has tended to promote effective organization at the local level. The communities (as well as local and national officials) thus become accustomed to community financing of services received. This community involvement is one of the major benefits that result from establishment of a revolving fund.

In practice, the establishment of these funds has followed three general patterns:

- 1) A grant is used to obtain the initial financing; the fund is then kept in operation by relending reimbursements as they are collected.
- 2) The fund is created in conjunction with a

TABLE 4—Functions of various levels of a typical rural water program.

National	Provide a financing channel for national counterpart funds, international loans, national grants, and local contributions Develop norms and policies (technical and administrative) Supervise execution of national plan Conduct long-range planning Coordinate construction efforts Supervise regional programs Exercise overall financial control Provide technical and administrative assistance Provide training
Regional	Supervise program execution Carry out design (in case of larger countries only) Supervise construction, operation, and administration of projects Undertake community promotion and supervision of projects
Local	Administration of system Operation of system Maintenance of system Collection of water rates

national or international loan, and is then maintained by relending those community reimbursements that exceed the amounts needed to pay off both the loan and the loan amortization.

3) The fund is created in conjunction with a loan, and is maintained partly by national government servicing of the loan and partly by income from community reimbursements over and above the amount needed to pay off the loan.

A recent study of conditions in Latin America (4) indicates that it is feasible for a rural family with an income of between \$250 and \$500 to pay for operation and maintenance of a typical rural water system and for capitalization of at least half of the total investment.

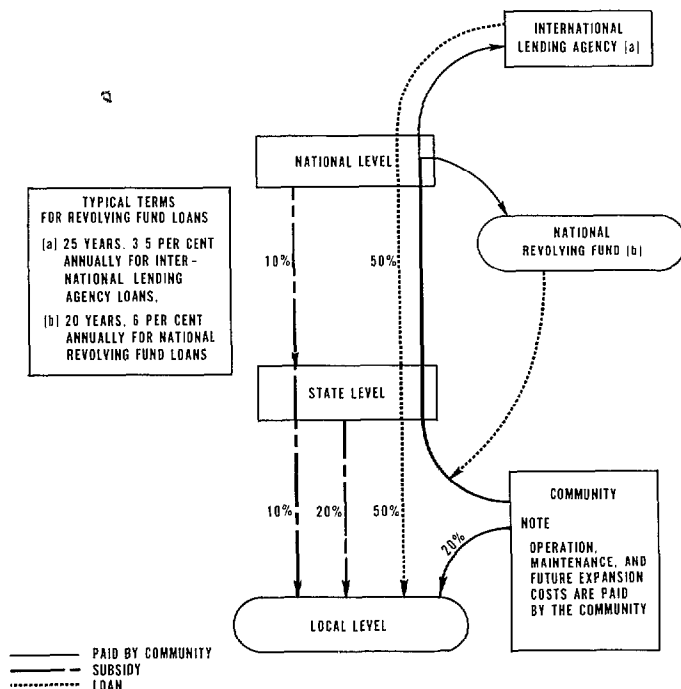
Whether or not this is done, development of new revolving funds requires the highest possible degree of local community participation. Without it such funds often become little more than construction funds that "revolve" only once.

The Mass Approach to "Rural" Water Supply

When one compares the need for "rural" water systems against what has been achieved to date, the need to increase the output of the various programs is readily apparent. To meet this challenge a technique called the mass or "systems" approach has become widely used in Latin America. Its objective has been to develop a coordinated and integrated "packaging" of those concepts that permit more rapid promotion, design, installation, operation, maintenance, and administration of the various projects. Because a rural program must repeat the same tasks for hundreds of villages—in some countries thousands—the development of such "standardized" techniques is essential in order to multiply the impact of limited resources.

Regarding technical standardization, existing maps or aerial photos (see Figure 2) are often used to plan the project, while modular design criteria, predesigned elements, and standardized equipment lists are used in the speedy develop-

FIGURE 1—A typical revolving fund plan.



ment of both project equipment lists and project plans. The materials are brought together in a central yard and sent to the community as a package, along with all necessary tools and other items not readily available at the site.

With regard to standardized personnel practices, technicians train and supervise volunteer workers at the local level. These workers carry out developmental and promotional activities in accord with the carefully designed and coordinated guidelines of the package program. Naturally the design and timing of a particular project must be closely coordinated with the needs, resources, and goals of the overall program.

Experience in Latin America has shown that these "modules" and this standardization can be a powerful and practical tool when the solutions developed are constantly reviewed to see that they produce maximum benefit at minimum cost.

Some Common Misunderstandings

Measurement of coverage. Available data indicate that 79 per cent of the urban and 27 per cent of the rural population of the region had access to potable water at the end of 1972 (see Table 6). However, these estimates must be

used carefully and with full understanding of how they were derived. For example, the reported degree of rural coverage is usually based on a comparison between the reported size of the rural population served and the size of the total rural population. But most or all of the dispersed people served by wells and rudimentary aqueducts are often left out of the rural "population served" figure, while all the dispersed population is generally included in the "total reported population." This situation can foster serious misunderstandings.

In checking the coverage in one country, for instance, it was found that the actual coverage of the rural program was 50 per cent if one compared the population served against the program's *target* population (the concentrated and village sector). Yet in this case the "rural" coverage reported was only 15 per cent. This problem is worrisome because it tends to cover up the success achieved by the rural programs.

Patio and house connections. One often hears the term "house connection" misused in the context of the Hemisphere's rural programs. Having such a connection implies that water is piped to the point of use, for example to a kitchen sink, a toilet, or a shower. Therefore, each "connection" may have two or more water use points. However, many rural

TABLE 5—Status of national revolving fund programs, 1971.

Country	Status of fund	Date	Fund data (US dollars)			Purpose of funds
			Source of funds	National	Loan	
Argentina	In operation	1965	National/IDB	5,000,000	5,000,000	Financing rural water systems
Bolivia	In operation	1970	National/PAHO		14,500	Financing rural water and sanitation programs
Brazil	In operation	1965	National/AID	4,300,000	2,200,000	Financing rural water systems
Costa Rica	In operation	1965	National/IDB	1,300,000	1,000,000	Financing rural water systems
Dominican Republic	In operation	1968	National/IDB	1,000,000	2,000,000	Financing rural water systems
	In operation	1970	National/PAHO	200,000	100,000	Financing rural sanitation programs
Haiti	In operation	1971	National/PAHO	50,000	50,000	Financing rural sanitation programs
Peru	In operation	1966	National	75,000	—	Financing house connections
Colombia	Under study	—	—	—	—	Financing rural water systems
Ecuador	Under consideration	—	National	—	—	Financing rural water and sanitation programs
El Salvador	Under consideration	—	National/IDB	525,000	1,500,000	Financing rural water systems
Paraguay	Under consideration	—	National/IDB			Financing rural water and sanitation programs

systems are designed to provide water to a single faucet in the patio—i.e., to a “patio” connection, from where it can be supplied to the point of use in a variety of ways depending on its purpose.

For example, on many occasions the author has seen a patio connection with a hose. This same hose was used to water the family garden, settle dust in the patio, and supply the shower. The connection was located just outside the kitchen window so that it could also be used in preparing meals.

With time and education, a limited number of such connections are converted to house connections. As the water consumption figure for a house connection is a good deal higher than for a patio connection (120 vs. 100 liters per person per day), it is often necessary to expand the system when many such conversions are made.

Current and Future Problems

Administrative vs. Technical Needs

A rural water supply problem is more administrative than technical in nature. Too often the matter has been approached via a series of small projects requiring independent technical solutions and a large number of highly skilled and hard-to-find professional personnel. In fact, the more successful programs have shown that each individual system should be treated as part of a larger framework using mass approach techniques to construct, operate, and administer hundreds of systems. This means that *all* actions (technical, administrative, and financial) must be coordinated at the central level—without forgetting that each project also needs strong local participation.

It must also be recognized that several years of groundwork will be needed to develop, coordinate, and refine techniques and to train technicians before the first system is built—and

that as the program grows the techniques must be redesigned and the technicians retrained.

Local Participation

All the programs of the region have actively sought the highest possible degree of local participation. In the initial promotion stages local water committees have been organized to promote the project, collect local contributions, etc. Once the project is completed the community generally elects a water board that is under the watchful eye of the national program. The board is in charge of operating and maintaining the system, collecting the rates, and undertaking minor expansions. Experience has shown that strong local participation is *essential* if the program is to succeed. Therefore the full support of the community must be enlisted from the start.

This means that local leaders must be identified and engaged in the project. Too often it has been concluded that “poorly educated” rural people lack the required skills to construct, operate, maintain, and administer their own water system. But it has been shown time and again that with proper guidance community leaders can make meaningful choices, motivate others, and provide the leadership required for success.

Emphasis on Low-Cost Programs

In developing the rural programs the most common approach has been to first build those water systems which have the lowest costs. This has resulted in most of the systems having gravity supplies or wells, access by road, and a large (15 to 20 per cent) community contribution toward the construction cost. The tendency has thus been to work in the “richer” areas. The approach has been justified on the grounds that it permits the quickest flow of funds into the program. This money can then be used for supplying water to areas with higher costs, thereby providing the greatest coverage in the shortest time. “Problem cases” are resolved as funds and resources become available.

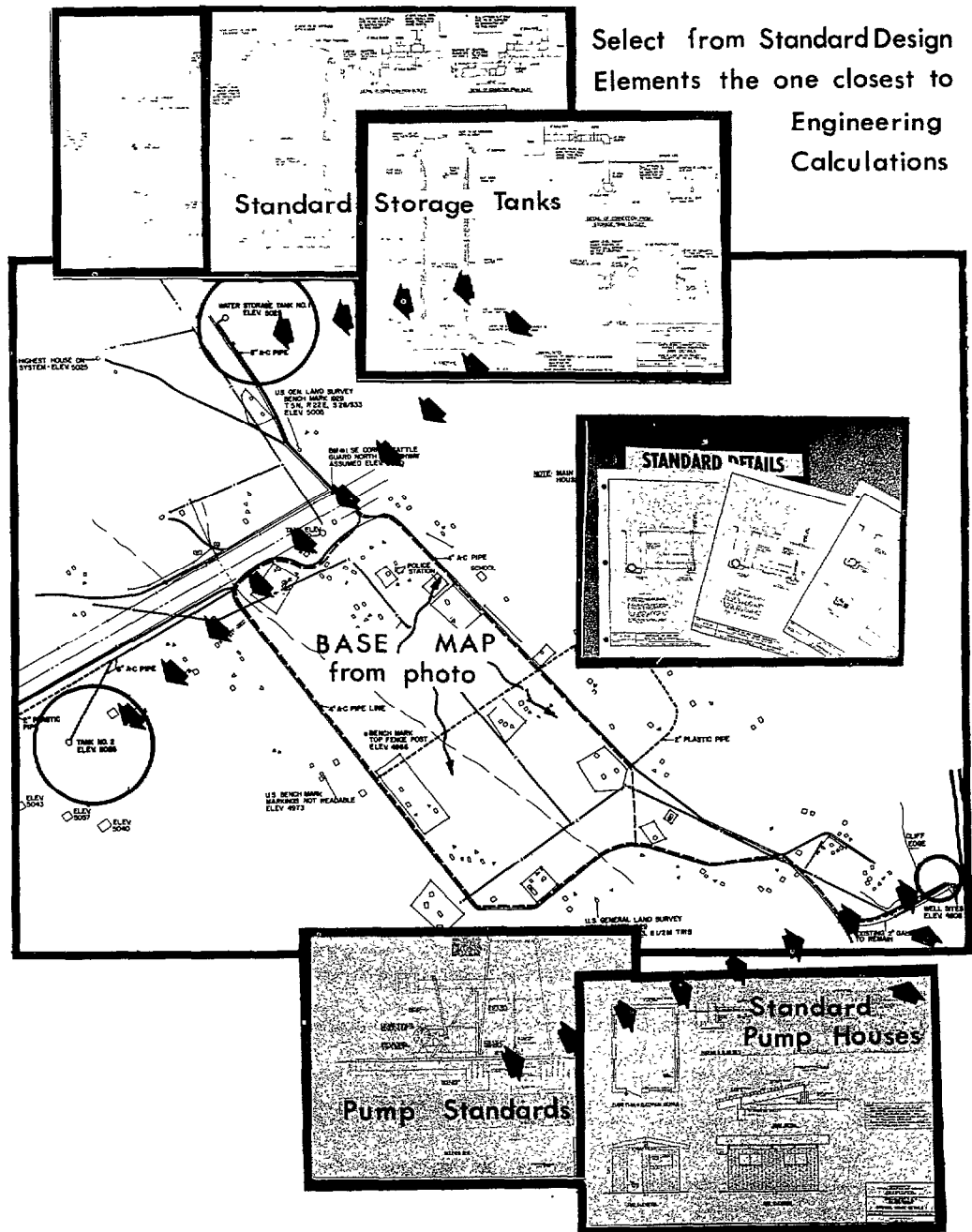


FIGURE 2—"Standardized" techniques help multiply the impact of limited resources. Aerial photos or existing maps, together with predesigned elements and standardized equipment lists help speed selection of project equipment lists and development of project plans.



Community members reduce construction costs by contributing their labor.

Public Health vs. Public Works

In most cases it was the sanitary engineers of the Ministry of Health who were the "fathers" of the rural water supply programs. Responding to their ministry's concern for rural health, they developed programs making efficient use of limited resources and stressing the vital need for community participation. Then, in the course of assuring this participation, local health center personnel (both promoters and sanitarians) became essential links in the effort to implement these plans.

Largely because financing was available through the Inter-American Development Bank, the rural programs have tended to grow much faster than the "well" or "rudimentary aqueduct" ones. As the rural programs have grown (thus requiring more capital and resources) they have tended to move out of the public health area and into the public works sector. This shift poses a new set of problems, including the following:

1) As a late-comer to the public works sector, the program must now fight hard to obtain its share of the sector's funds. The fact that this means reducing someone else's budget

or plans, together with the program's lack of financial experience, often makes for a difficult transition.

2) Increasing numbers of projects tend to pose ever-greater organizational problems for the rural programs. These require more personnel or new techniques, but often the manpower and financial resources needed are very hard to obtain. Moreover, this expansion makes the *esprit de corps* of the original close-knit group of workers increasingly hard to maintain—especially as the "original" group starts to leave.

3) As the programs leave the health sector, they also have trouble finding substitutes for the health center personnel (sanitarians and community promoters) who had been used as the local-level staff. And as each system settles into a routine the nature of the assistance changes and more administrative help is required. Therefore, new local-level staff must be trained or brought in.

4) As the number of systems in operation grows, the task of the program must change from merely promoting projects and building systems to also building the institutions and procedures needed to administer, operate, and maintain the systems built. These problems often cause strains among the program's founders, as many do not have the financial and administrative backgrounds needed to plan and implement such change.

TABLE 6—Status of water supply and sewerage system services in Latin America at the end of 1971 (population in thousands).^a

Country or other political unit	Date of data	Water Supply															Sewage disposal					
		Total ^a					Urban					Rural					Urban		Rural	Total		
		Population	Population served				Population	Population served				Population	Population served				Population served					
			House connections	Easy access	Total	%		House connections	%	Easy access	Total		%	House connections	Easy access	Total	%	No.	%	No.	No.	%
Argentina	Dec. 72	24,210	14,100	1,200	15 300	63	18,400	13,200	72	1,000	14,200	77	5,810	900	200	1,100	19	6,560	36	—	6,560	27
Barbados	Oct. 71	241	135	106	241	100	110	105	95	5	110	100	131	30	101	131	100	—	—	—	—	—
Bolivia	Nov. 72	5,190	894	515	1,409	27	1,650	790	48	485	1,275	77	3,540	104	30	134	4	390	24	68	458	9
Brazil ^b	Dec. 70	94,317	38,500	14,800	53,300	57	53,789	28,700	53	12,600	41,300	77	40,528	9,800	2,200	12,000	30	15,600	29	1,384	16,984	18
British Honduras	Dec. 72	127	36	21	57	45	69	33	48	19	52	75	58	3	2	5	9	3	4	—	3	2
Chile	Dec. 72	10,120	4,890	1,930	6,820	67	6,950	4,750	68	1,800	6,550	94	3,170	140	130	270	9	2,030	38	185	2,815	28
Colombia	May 72	22,800	11,293	2,080	13,973	61	13,300	9,293	70	2,000	11,293	85	9,500	2,000	680	2,680	28	7,817	59	3,060	10,877	48
Costa Rica	Dec. 72	1,867	1,293	143	1,436	77	635	603	95	32	635	100	1,232	690	111	801	65	255	40	0	255	14
Cuba	June 66	7,930	5,610	650	6,260	79	5,020	3,840	76	650	4,490	89	2,930	1,770	—	1,770	60	1,700	34	—	1,700	21
Dominican Republic	Dec. 72	4,406	1,226	655	1,881	43	1,936	1,064	55	450	1,514	78	2,470	162	205	367	15	307	16	—	307	7
Ecuador	Dec. 72	6,600	1,750	300	2,050	31	2,630	1,550	59	150	1,700	65	3,970	200	150	350	9	1,500	59	40	1,600	24
El Salvador	Dec. 72	3,684	715	1,126	1,841	50	1,452	581	40	479	1,060	73	2,232	134	647	781	35	450	31	11	461	13
Guatemala	Dec. 71	5,309	795	1,290	2,085	39	1,836	739	40	897	1,636	89	3,473	56	393	449	13	769	42	—	769	14
Guyana	Dec. 71	735	374	40	411	56	225	206	92	15	221	98	510	168	25	193	38	67	30	—	67	9
Haiti	Dec. 72	5,200	160	264	424	8	971	160	16	264	424	44	4,229	—	—	—	—	—	—	—	—	—
Honduras	Dec. 72	2,682	648	354	1,002	37	805	522	65	268	790	98	1,877	126	86	212	11	367	46	1	368	14
Jamaica	Mar. 72	1,925	780	869	1,619	86	520	500	96	9	509	98	1,405	280	860	1,140	81	139	27	29	168	9
Mexico	Dec. 72	53,320	28,360	1,700	30,060	56	32,300	21,810	68	1,700	23,510	73	21,020	6,550	—	6,550	31	15,600	48	32	15,632	29
Nicaragua	Oct. 71	1,951	781	252	1,033	53	942	663	70	192	855	91	1,009	118	60	178	18	398	42	—	398	20
Panama	Dec. 72	1,499	722	385	1,107	74	733	602	90	70	732	99	766	60	315	375	49	497	68	5	502	33
Paraguay	Dec. 72	2,329	180	226	406	17	877	180	21	135	315	36	1,452	—	91	91	6	129	15	0	129	6
Peru	Dec. 72	14,020	3,630	2,035	5,665	40	6,410	3,470	54	1,200	4,670	73	7,610	160	835	995	13	4,170	65	12	4,182	30
Surinam	Dec. 72	393	163	104	267	68	201	147	73	54	201	100	192	16	50	66	34	85	42	—	85	22
Trinidad and Tobago	Dec. 70	1,060	562	460	1,022	96	358	297	83	59	356	99	702	265	401	606	95	181	51	2	183	17
Uruguay	Dec. 72	2,956	2,155	292	2,447	83	2,369	2,065	86	222	2,287	96	567	90	70	100	28	960	40	262	1,222	41
Venezuela	Dec. 71	10,700	6,893	1,963	8,856	83	7,300	5,570	76	1,730	7,300	100	3,400	1,323	233	1,556	46	3,400	47	121	3,521	33
Eastern Caribbean countries and territories	Dec. 70	504	131	232	363	72	168	74	44	55	129	77	336	57	177	234	70	14	8	—	14	3
Total		286,095	126,776	34,592	161,368	56	161,976	101,574	63	26,540	128,114	79	124,119	25,202	8,052	33,254	27	64 018	40	5,212	69,260	24

^a Current estimates of population and population served as received from countries by the Department of Engineering and Environmental Sciences, PASB.^b Data furnished on WHO questionnaires, 1970.

In sum, this is the critical juncture, where today's techniques must be scaled up to serve tomorrow's large-scale programs. This implies two things: that multidisciplinary professionals are badly needed to develop programs via which techniques, criteria, and procedures can be applied by technicians on a mass scale; and that there must be thorough retraining of present staff in techniques and skills to be used in the future.

Use of Urban Concepts

Serious problems often result when program designers try to "scale down" urban concepts to fit rural situations. For example, because an urban water system is designed to make water instantly available in unlimited quantities, the rural designer may try to provide the same service in the rural setting, thus producing an overly large and expensive system.

Manpower Considerations

The Governments of the Americas have cited

the following factors, in order of importance, as the major constraints on construction of water supply systems: (1) insufficient internal financing, (2) inappropriate administrative structures, (3) inappropriate financial frameworks, (4) lack of trained personnel, (5) inadequate or outmoded legal frameworks, and (6) insufficient production of local materials.

Even though it is only fourth on the list, the personnel problem seems especially thorny. That is because this lack of trained manpower implies more than a need for extra training; it implies setting up conditions that can attract and hold the required personnel. At their 1972 meeting in Santiago the Ministers of Health said: "All the health personnel in these [rural] areas merit relatively higher compensation for their efforts" (14).

Another important consideration is that the worker in rural programs should be more of a generalist than a specialist. The reason for this is that the problems encountered involve many social and technical disciplines. Thus, each professional must be more closely aware of problems in related fields and must be able to



A professional training technicians to advise community members about a program.

build "bridges" to those problems that interface with his. Without this close and careful coordination, be it accomplished by "systems analysis" or by using a small central staff, the rural water program quickly becomes chaotic.

Quite aside from the generalist-specialist problem, technical plans have often been implemented without thinking much about the technicians who will be required to make the program work. For example, we need to train pump repairmen as we install pumps, or soon we will have an additional expense instead of a water-producing device.

Another vital point is that competent and dedicated national professionals must be available to carry out expanded programs. Too often past programs have depended entirely on a small, highly-motivated group of individuals. While the vision and social concern of these persons deserves great credit, large-scale programs cannot effectively rest on such a narrow base. Therefore, the countries must seek to increase the number of professionals and technicians that enter this field. Moreover, these persons should be "rural" experts trained in "rural" techniques, for experience has shown that experts transferred from "urban" areas tend to use inappropriate techniques that unnecessarily increase project costs.

Data Gathering

In designing water systems, good population and consumption data is often critically important. When the programs started in 1961, "best guess" figures were used. In most cases populations were expected to at least double in 20 years and consumption was estimated at roughly 200-250 liters per capita per day. Over the years it has been found that these figures were too high and that they caused unnecessary investments. While prediction of future population size continues to pose problems, a growing body of knowledge has emerged on which to base more realistic consumption figures.

Another problem is that, in their rush to get started, programs have frequently failed to

obtain sorely needed data on potential water sources. Thus, many of them have initiated water surveys to locate potential sites, but limited funds usually condemn these investigations to be "one step" in front of construction. The result has often been hasty decisions that were expensive to correct later on.

Rurban vs. Dispersed Rural Populations

In the past, priority was given to "urban" areas, leaving a backlog of need in the "rural" zones. But as the countries have realized the need for coordinated development the "rural" problems have called forth increasing amounts of attention and resources.

The approach that has been used most frequently to date utilizes existing villages as "poles of attraction," rather than concentrating attention on the more dispersed small farms. However, as solutions are found for the rural areas, attention must be turned to the dispersed population. In its recent "Sector Working Paper on Agriculture," the World Bank indicated that as "developing countries become increasingly conscious of the need to provide employment opportunities and distribute incomes more equitably, greater emphasis is likely to be given projects intended to benefit small farmers and to be labor-intensive" (7). The implication is that "rural" water programs will need to develop more programs for dispersed and semi-concentrated populations.

To meet this challenge, new approaches must be developed. For just as "urban" techniques and approaches are of limited value in the rural sector, it is to be expected that the rural experience will only serve as a general guide for helping the dispersed populations. The few such "dispersed" programs now in existence are of such size that they can provide only limited data; but solutions must be found if effective "balanced" water programs are to be developed.

Future Financing

The Inter-American Development Bank has

been highly instrumental in the growth of the Hemisphere's rural water programs to date. But there is a need to develop additional or alternate financing sources and to explore new schemes. The question of self-financed projects or subsidized ones must be faced and the monetary recovery from each type of project must be realistically determined. We also need to find ways of interesting more official agencies (such as central banks and social security institutes) in making long-term low-interest loans.

Up to now about 50 per cent of the initial funding has been covered by international loans, about 30 per cent by government grants, and about 20 per cent by local contributions. However, the international agencies are beginning to require more matching money, a development which will require the programs to revise their financing sources and techniques.

In May 1972 the 25th World Health Assembly considered the special needs of the rural sector and recommended that WHO Member States "take such steps as would lead to increased allocation of resources to rural water supplies." The task will not be easy. For example, the World Health Organization technical assistance budget for the water supply area is only \$26 million, a tiny fraction of the roughly \$13 billion needed for the countries to achieve the WHO goals for 1980.

Therefore, while the work of the 1960's can serve as a guide, we must be prepared to finance new solutions. For instance, it might be desirable for lending agencies to make loans for administrative development just as they now do for project construction.

Research

Research into a number of subjects is also needed. For example: What is the potential for making more effective use of financing schemes such as revolving funds? What exactly are the monetary costs and benefits of water supply systems? How can we reduce the cost of

expensive program elements? How can we get more accurate data on water consumption, water loss, and future population growth? What new methods—such as the use of plastic pipe, modular units, and the "mass" approach—should be considered, and when?

In addition, we need to improve and/or modify many of the skills and techniques that have been developed in the 1960's. Among other things, as programs expand into smaller communities and dispersed areas, closer attention will have to be given to developing solutions which are financially acceptable to the user as well as being socially and administratively feasible. We will also need to improve our communications with the policy-makers and the techniques by which information is developed for them, in order that they can better understand the actual costs of their decisions.

The Vital Need for Safe Rural Water

Far too many in the rural areas are still without an adequate supply of water. To help remedy this the goals of the 70's have been set, and now we need to find the ways and means to help the people involved as they strive to receive the benefits of safe water in their homes.

To achieve this ultimate goal—delivery of safe water as near as possible to its point of use—we must keep the consumer firmly in mind. His needs are the constant value in the equation. Our efforts must be directed at finding answers to his problems and *not*, as has too often been the case, at satisfying our preconceived notions of what we think the problems are.

Our immediate object is to supply safe water to all those in the rural areas who want it or need it—at a price they can afford and in a manner they will find useful. This must be done as quickly as is humanly, technically, and financially possible; for too many in the rural areas have already been asked to wait for much too long.

SUMMARY

Growing attention is being focused on rural water supply problems in Latin America as a result of major progress over the past decade. By the end of 1972 roughly 27 per cent of Latin America's rural dwellers had access to potable water. While this meant that four times as many people had safe water in 1972 as in 1961, it also meant that a great deal of additional effort would be required to meet the new goals established by the Ministers of Health of the Americas for 1980. Making this effort implies reviewing the kinds of rural water systems to be installed, the administrative and financial structure of the overall program, and the approaches that have been adopted.

Past programs in this Hemisphere have tended to concentrate on the village or so-called "rurban" parts of the rural areas, in order to reach the most people in the shortest time at the lowest cost. There has also been a strong trend in favor of "revolving" funds to supply internal financing and another trend in favor of a large-scale approach that uses carefully timed and coordinated community promotion "packages," modular design techniques, and "mass approach" concepts at all levels. However, great emphasis must still be placed on getting the extensive and enthusiastic local participation and support that has been responsible for so much of the success achieved to date.

BIBLIOGRAPHY

- (1) Acurio, Guido. "Agua potable rural: Perú." Unpublished report to the Director de Saneamiento Ambiental on the rural water program of Peru. Lima, División de Saneamiento Rural, 1969.
- (2) Argentina, Subsecretario de Recursos Hídricos, Servicio Nacional de Agua Potable y Saneamiento Rural de Argentina. *Guía para organización y administración de cooperativas y de sistemas de abastecimiento de agua*. Buenos Aires, 1972.
- (3) Boris, Samuel B. A basic critique of foreign assistance programs in the light of Guatemala's present water needs. In: *International Conference on Water for Peace*. Washington, D.C., Department of State, Office of International Conferences, 1967.
- (4) Davis, R. *Rural Water Supply Services: Community Financing*. Washington, D.C., Pan American Health Organization, 1968. (Special Meeting of Ministers of Health of the Americas, Document No. REMSA/INF/12.)
- (5) Donaldson, David. El enfoque masivo. *Ingeniería (Mexico)* 24: 25-34, 1970.
- (6) Donaldson, David. Rural water supplies in developing countries. *Water Resources Bulletin* 8: 391-398, 1972.
- (7) International Bank for Reconstruction and Development. *Sector Working Paper on Agriculture*. Washington, D.C., IBRD, 1972.
- (8) Lauria, Donald T. *Planning Small Water Supplies in Developing Countries*. Chapel Hill, University of North Carolina, 1972.
- (9) McNamara, Robert. *Address to the Board of Governors*. Washington, D.C., International Bank for Reconstruction and Development, 1972.
- (10) Morfitt, Robert P. *A Non-Conventional Mass Approach to Rural Village Water Projects*. Corvallis, Oregon; R. P. Morfitt and Associates, 1969.
- (11) Pan American Health Organization. *Annual Report of the Director, 1971*. Washington, D.C., 1972. (PAHO Official Document 116.)
- (12) Pan American Health Organization. *Annual Report of the Director, 1972*. Washington, D.C., 1973. (PAHO Official Document 124.)
- (13) Pan American Health Organization. *Community Water Supply and Sewage Disposal Programs in Latin America and Caribbean Countries*. Washington, D.C., 1969. (Technical Series on Engineering and Environmental Sciences, No. ES-5.)
- (14) Pan American Health Organization. *Ten-Year Health Plan for the Americas*. Washington, D.C., 1973. (PAHO Official Document 118.)
- (15) Rose, Cecil W. *Common Sense Designs for Rural Water Systems*. International Conference on Water for Peace, 1967.
- (16) Smith, T. Lynn. *Studies of Latin American Societies*. Garden City, New York; Doubleday and Company, Inc.; 1970.
- (17) World Health Organization. *Community Water Programme—Progress Report by the Director General to the 25th World Health Assembly*. Geneva, WHO Document No. A 25/29, 1972.
- (18) World Health Organization. *Twenty-Fifth World Health Assembly; Part I: Resolutions and Decisions Annexes*. Geneva, WHO, 1972, pp. 16-17. (Official Records of the World Health Organization, Document No. 201.)