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WATER SUPPLY AND

**COST RECOVERY FOR WATER SUPPLY:  
A REVIEW OF EXPERIENCE**

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## COST RECOVERY FOR WATER SUPPLY: A REVIEW OF EXPERIENCE

### I. INTRODUCTION

In May 1985, the Development Assistance Committee of the OECD decided during a special meeting on water supply and sanitation issues to request the World Bank to prepare a paper examining examples of cost recovery experiences in developing countries, focusing particularly on water supply. This report, responding to that request, summarizes the findings of a review of 33 case studies which examine cost recovery implications for water.

#### BACKGROUND

The International Drinking Water Supply and Sanitation Decade (IDWSSD) has focused attention on the large amount of investments needed to supply some 2,300 million people, yet unserved, with safe water and sanitation by the end of the Decade. Encouraging progress has been achieved in the first half of the Decade in extending services to millions of people. Nevertheless, the number of people still unserved continues to grow, as populations increase and as some water supply programs and investments fall short of expectations. Inadequate maintenance of facilities and insufficient local support have slowed progress greatly.

It has become increasingly clear that unless the users of water supply improvements bear a larger share of the costs, the prospects for accelerating the pace are not promising. The sums required to attain the Decade's goals are huge, and the resources that central governments and external assistance can provide are limited. Users must share more of the burden (either through water fees or local taxes) if viable solutions are to be achieved. Increased user participation not only helps cover costs, but also tends to lead to better maintained, better managed systems, more in accord with users' preferences.

Cost recovery means simply the collection of revenue from users, the proceeds of which are then available to meet expenses. Increased cost recovery can be advantageous for several reasons, including:

- (i) Replicability - Limited government resources combined with rapid growth and increasing demand require that users pay; without cost recovery utilities may not be able to replicate projects.
- (ii) Financial Viability - Prudent financial management requires financial independence; the existence of large scale subsidies undermines financial discipline and, from there, institutional and managerial autonomy.
- (iii) Efficiency - Users should pay prices that reflect real costs in order to attain efficiency in the use of scarce resources.

The appropriate level of cost recovery (that is, how much revenue should be collected relative to costs) depends on many considerations. Trade-offs have to be made among multiple objectives, reflecting efficiency, equity,

poverty alleviation, and other concerns. In general, the World Bank recommends that the aim be to recover as much of total costs as possible. In some instances, that will lead to full cost recovery. In others, there may be extenuating circumstances that justify less than full cost recovery. Currently, cost recovery rates are very low in many countries, and often zero in rural areas. The overriding goal at present should therefore be to raise cost recovery rates substantially.

In figuring costs, all costs must be counted, including:

- recurrent expenditures (operations, administration, maintenance, and depreciation);
- allowances for debt service and, where appropriate, capital replacement and expansion; and
- an allowance for "profit" or net income, providing a reasonable return on assets.

In some prior studies, it has been suggested that cost recovery policies should aim to cover only the operating and maintenance costs. There are drawbacks with that strategy, however. A better approach, in cases where there is some reason why cost recovery must be less than 100 percent, is simply to pick a percentage target -- 80%, 50%, or whatever -- and then set charges accordingly. One can pick a target, if one likes, that is equivalent at that moment to recovering operating and maintenance costs; but the principle should be clearly established that charges will not be tied in future to the level of operating and maintenance expenditures. When cost recovery is tied to operating and maintenance expenditures, inappropriate incentives are created which could lead to ill-advised future investment choices.

The levels and structure of charges should be based as nearly as possible on the principles of efficiency pricing. Those principles relate to helping maximize the net economic benefits of how resources are allocated and utilized, both within and across sectors. Efficiency pricing requires that tariffs reflect the incremental economic cost of supplying one extra unit of water. In technical terms, the benchmark should be the long run marginal cost, as approximated by the average incremental cost. (See Annex A).

Experience has shown that several key elements must be in place in order for cost recovery to be successful, including:

- (i) The political will to charge for the costs of the service and adjust rates regularly;
- (ii) The presence of sound commercial accounting systems;
- (iii) Efficient billing and collection procedures;
- (iv) A cadre of competent staff; and
- (v) Effective programs to reduce water losses.

In rural areas where handpumps and similar appropriate technologies

are used, specific criteria for cost recovery include:

- (i) village participation starting from the initial request for assistance, through construction and ongoing operation and maintenance;
- (ii) a history of community organization; and
- (iii) the integration of water projects into broader rural development projects.

#### SCOPE AND LIMITATIONS OF THIS STUDY

The 33 case studies on which this study is based were drawn from reviews of project and policy documents of developing country governments and donor agencies, and from consultations with knowledgeable authorities with field experience. These 33 comprise all of the adequately documented case study examples that could be located within the time and resources available. A large proportion are from World Bank experiences. Obviously, there is no guarantee that the cases examined are in any sense statistically representative for a larger universe. Many of the cases are from Africa and Southern Asia.

The study does not discuss sanitation strategies, only water supply. It also covers only systems within the public sector or somehow associated, however remotely, with government programs or agencies, local or central. Thus it does not describe purely private sector initiatives, such as water vendors. Both exclusions -- sanitation and private sector practices -- stem partly from the focus of the DAC's request, partly from resource constraints for the study, and partly from lack of pertinent data for rural water.

Data limitations, even for the best cases reviewed, were a handicap. The original plans for the study anticipated a far more detailed analysis than in fact proved to be possible. Early on, the authors concluded that, because the available evidence on cost recovery in the water sector is far less complete and less substantiated than has generally been believed, a more in-depth research effort is needed, involving new primary data collection through field investigations. This recommendation has been favorably received within the World Bank, where the required new research has been initiated; the results will begin becoming available during 1988. The present report thus should be viewed as an interim assessment based on the best information now in hand.

## II. COST RECOVERY IN PRACTICE

This section summarizes the main themes that emerged from the review of the case studies. Brief descriptions of each of the case studies are in Annex B.

### URBAN EXPERIENCE

The 33 case studies included 14 urban and 19 rural systems. Cost recovery experiences differed significantly between the urban and rural cases, reflecting the differing challenges, possibilities, and problems of urban and rural water supply distribution.

#### Instruments

The principal instruments used to recover costs in the urban cases were (i) a fee based on measurement of the user's actual consumption of water, with consumption measured by metering or proxies such as pipe diameter or number of connections; (ii) a "flat rate," such as a water surcharge on the property tax, (which is not dependent on the amount of water consumed); (iii) a fee for connection to the system, or (iv) some combination of the above. Table 1 summarizes certain key characteristics of these instruments. (See also Box 1 for a different taxonomy).

In urban as in rural areas, choices of instruments can depend in part on the type of distribution system through which the water is supplied. Fees based on metering are feasible only where water is piped to the user, and, of course, where meters have been installed and are kept in good working order. These requirements are satisfied much more commonly in urban areas than in rural areas. Where metered fees are employed, special arrangements may have to be devised for situations where some water outlets serve multiple users (e.g., a neighborhood standpipe), or where some users share the same meter (e.g., one meter for an entire apartment building).

Flat rates are feasible in all systems. In numerous variations, flat rates are the most common method of cost recovery in use currently. They have an important drawback, however: the amount the user pays is not linked directly to the quantity of water consumed. Each individual user pays the same whether he uses a little or a lot of water. Flat rates hence do not provide incentives to conserve water and avoid waste. (Some types of flat rates, such as taxes that vary with property value and/or type of use, do collect more from certain large users than from small users. Yet each user still pays a fixed amount regardless of the amount consumed.)

Fees based on measurement of consumption, by metering or other means, do contain incentives to minimize waste. But metering entails added costs -- to purchase, install, maintain, and regularly "read" large numbers of meters dispersed throughout the community. Billing and collection procedures are not as simple as they are with flat rates. A larger staff, with more skilled technicians may be required. The added costs and administrative complexity can outweigh the benefits of metering, particularly in systems with many small users. Studies have shown metering of high volume industrial and

Table 1: Characteristics of Typical Cost Recovery Instruments

Instrument for cost recovery	Types of Water Supply Systems Where Feasible	Does the Charge Depend on the Amount of Water Used?	Locations Where Commonly found	Comments
<p>Flat rate (e.g., 100 pesos annually per family; or a yearly surcharge payable by property holders, varying with the value of the property)</p>	<p>All Systems</p>	<p>No. Hence user has no incentive to curb unnecessary consumption.</p>	<p>Rural mainly</p>	<p>Is usually regressive, relative to fees per unit.</p>
<p>Fee per unit of water consumed: with consumption measured by metering. (e.g., 2 yuan per 1,000 litres)</p>	<p>Systems where: (i) water is piped to each user's home or workplace, and (ii) meters are installed, maintained, and regularly "read" for each user</p>	<p>Yes.</p>	<p>Urban mainly</p>	<p>The cost of meter maintenance and repair may exceed the revenue benefits particularly among individual domestic consumers.</p>
<p>Fee per unit of water consumed: with consumption measured by pipe diameter or number of house connections.</p>	<p>Piped water systems</p>	<p>Yes. Hence user has direct incentive not to consume more water than needed.</p>	<p>Urban mainly</p>	<p>Less expensive than metering, for systems with large numbers of low volume users.</p>
<p>Fee per unit of water consumed: with consumption measured by containering (e.g., 10 rupees per container from a water vendor)</p>	<p>Systems that require hauling of water (non-piped transport) to home or workplace.</p>	<p>Yes. Hence user has direct incentive not to consume more water than needed.</p>	<p>Found in both urban and rural. Rare where piped systems have been installed.</p>	
<p>Fee for connecting user to network (a one-time charge)</p>	<p>Piped water systems</p>	<p>No</p>	<p>Urban mainly</p>	<p>(1) Helps reduce the average or per unit cost of utilizing the system. (2) Large initial lump sum payments, when required, can act as a deterrent to connections.</p>



### Box 1: Cost Recovery Instruments: A Taxonomy

Several instruments have been applied in Bank-assisted projects to recover costs for water supply services, including fixed charges, dedicated taxes, volumetric tariffs, and connection fees.

Fixed charges are levied based on the value of property, or other proxies such as the number of taps in the house, size of connecting pipe, etc. These charges yield relatively predictable revenues but do little to encourage conservation and, at best, only roughly relate charges to volumes consumed or the cost of supply.

Dedicated taxes are applied as a surcharge on the real property tax or a water and sewerage tax is sometimes employed. These taxes rely upon rental value or market value of the property as the tax base. The proceeds are in principle transferred by the revenue collection agency (usually a municipality) directly or indirectly to the water supply entity. There are problems with this instrument because of the poor administration of the property tax in many developing countries. Cadasters are generally old and thus do not reflect current additions and changes to properties. Because property tax levels are not revised periodically as required to reflect market values, this constitutes revenue losses for the utility. In addition, because the proceeds are transferred to the water authority, the water authority sometimes receives reduced allocations if the revenues of the local government are insufficient to meet its own obligations.

Volumetric tariffs that reflect, wholly or partially, the marginal cost of water supply have been used quite extensively in Bank-financed projects largely because of: the close relationship between revenues received and quantities supplied; the potential buoyancy of tariff revenues when effectively administered; the relative ease of administration (compared with taxes in general); and the rough correspondence between growth in tariff revenues and the corresponding increase in operational needs for funds. These observations, of course, presume the existence of sound systems and competent managerial and technical staff. The principal practical defect of volumetric charges, however, is that their actual yields often fall far below their potential. The problem may lie with the tariff rate base since the rate at which users connect to the system is difficult to predict with precision and lower than expected rates of connection seriously affect revenue generation. The overwhelming problem with the tariff is often the inability to bill and collect its full potential yield for a variety of interrelated political and administrative reasons.

Connection fees are imposed on a onetime basis, often to recover all or part of the capital costs of water connections. Where they are substantial relative to users' income levels, they can have the effect of deterring low income users from connecting to the system. To avoid that result, some water authorities deliberately keep connection fees low, in effect subsidizing connections with funds obtained from other sources, such as revenue from volumetric tariffs.

commercial water consumers to be cost effective and a potentially significant source of revenue in large cities. In Bombay, for example, metered industrial and commercial customers account for 56 percent of water revenues as compared to 14 percent domestic, 10 percent government and 20 percent from property surcharges.<sup>1/</sup> Decisions about whether to implement a metered fee scheme must consider the tradeoffs between the costs and benefits of metering among different consumer classifications.

Fees for connection to the system are a onetime charge. Where they are substantial, they can deter low income populations from applying for a connection. In Tunisia, where the water utility is well-run and cost recovery rates are high, subsidies are applied to lower the cost of connection of low income customers. In other countries, connections are encouraged by amortizing the fee into affordable monthly payments. By increasing the number of connections, unit charges can be lowered.

At least nine of the case studies were found to rely on tariffs based on metered connections or other measurement proxies, such as pipe diameter and number of connections, to determine individual payments. Many had flat rates either in lieu of or in combination with other charges. Often, as in India, flat rates took the form of an explicit surcharge, based on a percentage of the property tax.

Frequently, costs are recovered through bulk sales to municipal authorities which then retail water to individual consumers. Problems of late payment by municipalities can sometimes be dealt with by upfront intergovernmental transfers as is required in water supply projects in South Asia. Limited information is available on how much revenues are collected by consumer classification and on the actual burden imposed on consumers by water charges.

#### Amount of Revenue Collected

In most of the urban cases reviewed, the amount of revenue collected was far less than what it would need to be for full cost recovery. Results from 10 urban systems ranged from 62 to 108 percent during a six year period, with a mean of 89 percent recovery of the costs of operations, maintenance, depreciation and interest.

The pattern of less than full cost recovery appeared to worsen after policy decisions were taken to increase cost recovery. In 1977, for example, the mean cost recovery ratio was 93 percent; this ratio fell to 82 percent by 1982 (see Table 2). Systems in Colombia, Ecuador, Jamaica, Turkey, and India remained unable to reduce sizeable annual operating losses; and continued to rely on Government for operating subsidies.

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<sup>1/</sup> Dillinger, William, Financing Urban Services in India, October 1, 1984 draft paper, Water Supply and Urban Development Division, South Asia.

While fluctuations in the cost recovery ratio are to be expected, some enterprises have exhibited such poor tariff management that when depreciation and interest charges come due the low revenue yields place them in a worsened financial situation unable to cover even recurrent costs alone from revenues.

In instances where low cost recovery resulted from low tariffs the following problems with tariff setting procedures were cited:

- (i) failure to properly adjust for seasonal differences in costs;
- (ii) failure to properly adjust for income distributional objectives (Somalia and Sri Lanka);
- (iii) failure to properly adjust for inflation (Colombia and Jamaica);
- (iv) failure to properly estimate demand, including errors in population projections (Ecuador) and quantity desired (Bahamas); and
- (v) failure to adjust tariffs over time (India, Pakistan, Syria and Turkey).

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Table 2: Comparative Cost Recovery <sup>1/</sup>

	<u>Before</u>	<u>After</u>
Cost Recovery Ratio <sup>2/</sup> (without depreciation and interest charges)	131	116
Cost Recovery Ratio <sup>3/</sup> (with depreciation and interest charges)	93	82

<sup>1/</sup> This table compares the actual cost recovery results of 10 urban systems before and after institutional and policy charges (base years 1977 and 1982).

<sup>2/</sup> The cost recovery ratio is defined here as the ratio of revenues (from water and sewer charges, connection fees and meter rent) to operating expenses (including costs of personnel, material, maintenance, administration, electricity, chemical and fuel).

<sup>3/</sup> Measures the effect of depreciation and interest charges.

Note: This table does not reflect results of intervening years. It does not reflect indirect costs of inadequate maintenance, neglect, and high unaccounted-for-water, all of which would lower the cost recovery ratio.

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Notable exceptions, include systems in Panama, Tunisia, and Yugoslavia, which consistently had cost recovery ratios over 100 percent -- generating surpluses after operating expenses (including depreciation and interest charges) were met. The following characteristics were noted among these systems which were well-run:

- strong management that is willing and able to take difficult decisions (for example, on reduction of arrears due by public agencies);
- regular tariff adjustments to reflect rising costs;
- good performance in recruiting and retaining well-qualified professional and technical staff;
- efficient accounting systems that provide useful and timely data for informed management decisions; and
- regular attention to cost reduction, including leak detection and repair programs to reduce unaccounted-for-water.

The water system in Panama owed its good cost recovery performance to governmental support and effective management. In less than five years, operational efficiency changed dramatically: the staffing ratio fell from 20 employees per thousand connections to 14; tariffs were regularly revised; the volume of water sold and the number of connections rose; and simultaneously the enterprise improved its collection efforts.

In Tunisia, good leadership and strong institutional capacity enabled management to anticipate and respond to problems effectively. In Yugoslavia, frequent tariff increases (10 to 30 percent per year) were crucial. Because the water company maintained its creditworthiness, it was able to turn to borrowing (as opposed to subsidies) when its internal cash contributions fell below anticipated levels.

A few enterprises achieved notable improvements in cost recovery performance by adherence to policy guidelines and covenants linked with well-defined tools for implementation. In Pakistan, legal agreements were augmented by an Operational Action Plan which included certain "monitoring indicators." The performance indicators selected were specific to tariff adjustments, illegal connections and system leakage, and metering. Likewise, in Sri Lanka, a similar concept called "Financial Recovery Program" yielded positive results in a relatively short period. Within two years, the enterprise began covering 25 percent of its total operating costs, a marked improvement over its past record of only 5 percent coverage. Similar "monitoring indicators" have been introduced in Nigeria and appear to be achieving results. The lesson here is that policy decisions and covenants by themselves are insufficient to bring about required financial and operating reforms; they must be linked with operational action plans.

## Problems

In most of the cases, the effectiveness of cost recovery efforts was impaired by the presence of one or more of a wide variety of problems. Underlying many problems was a lack of enough commitment by appropriate government leaders and institutions to persevere with necessary reforms despite strong countervailing political pressures. In addition, more specific sources of difficulty were evident as well, particularly in the areas of (i) billing and collection; (ii) tariff adjustment; and (iii) institutional capacity. (See also the Annex Table 1 relating rates of cost recovery to operational efficiency indices such as unaccounted-for-water, arrears, and staffing ratios.)

### (i) Billing and Collection

The effectiveness of billing and collection procedures depends upon the commitment of management, the calibre of accounting staff, the reliability of recordkeeping systems, and the existence of appropriate sanctions for non-payment. Some water authorities fail to prepare bills on time because of slow meter repair (India), or bill consumers for as little as one-half the correct amount because of lack of proper records and erroneous bills. Difficulties with billing and collection combined with ineffective sanctions, result in huge arrears of uncollected amounts and low yields for these utilities. Accounts receivable in Pakistan, Syria and Turkey consistently ranged from about 5 months to over 15 months' billings. Such high levels of accounts receivable seriously affect the liquidity of the enterprise.

In at least seven cases, the major defaulters (and often largest customers) were government and parastatal organizations because of their own budget problems or bureaucratic inefficiency. Half of Somalia's accounts receivable, for example, was due from government, its largest client.

In two cases collection of revenues was done not by the water company itself but by municipal departments. The municipal authorities were generally sluggish in both collecting and transferring revenues to the water company. Their enforcement powers were weak. These experiences suggest that responsibility for billing and collection should rest with the supplier itself which is legally empowered to interrupt services and pursue other sanctions for non-payment of levies.

Another factor sometimes contributing to low collections is consumer noncompliance. In certain inner city Kingston areas consumers resisted payment because service was poor. In Turkey, consumers balked at a 56 percent increase. In these two cases, problems of low collection rates were compounded by unstable political and economic environments that limited the extent to which these utilities could enforce sanctions.

(ii) Tariff Increases

Because raising tariffs involves painful political choices, increases are often too little and too late. The approval body, generally the parent Ministry, may delay an increase, at times because of broad economic concerns during highly inflationary periods, or because of inertia in the bureaucratic process. Water rates in Sri Lanka remained unrevised for seven years prior to 1984. In Panama rates remained unchanged for 20 years.

Frequently, however, the greatest obstacle to tariff increases appears to be within the utilities themselves. The continued use of cash accounting, as opposed to the accrual method, results in an absence of information relating revenue needs to costs. India's unrevised, low tariffs, for example, were reported as due to a lack of institutional appreciation and support for the importance of operations and maintenance and its relationship to costs and revenues.

When revenues depend on flat rates, tariff adjustment is frequently affected by broader problems as well. In Colombia, low yields from the transfer of valorization collections was further compounded by irregular revision of land values on which valorization charges were based. In India and Pakistan, revenues were constrained by the fact that the municipal taxes on which the water surcharge was based were linked to rent control legislations.

Establishing adequate tariffs and enhancing billing and collection can lead to greater yields, but they must be complemented by steps on the expenditure side to contain costs. Efforts must be made to stop leaks, regularize clandestine connections, replace defective meters with flow restriction devices or repaired meters. High water losses persisted in nine of the countries reviewed. Ecuador reported a 50 percent water loss, Turkey 44 percent, Colombia 38 percent, and Jamaica 31 percent. Existing data suggest that reducing losses from 50 percent (Borneo, Nigeria) to 40 percent would have the same revenue impact as a 20 percent increase in tariffs.

(iii) Institutional Capacity

No water supply institution will produce anticipated results unless there are qualified persons to manage, operate, and maintain it. Major staffing problems are characteristic of poorly run utilities. Staffs are often excessively large, with inadequate and undermotivated personnel. Despite policy recommendations to reduce wage bills and the ratio per one thousand connections, personnel costs continued to be excessive in at least four cases. In one country an additional 120 employees were added shortly after a new government took office.

Measurement of organizational viability depends in part on the existence of accounting and financial systems that produce timely, relevant data for management decisions. Many of the enterprises reviewed had ineffective systems due to a variety of factors, including:

- (i) accounts were overly centralized and maintained on a cash rather than an accrual basis;
- (ii) accounts were not sufficiently detailed to be used to estimate marginal costs or average costs for use in tariff review and tariff setting procedures; and
- (iii) accounts did not distinguish between water revenues and related expenses.

In many instances, studies had recommended changes such as:

- (i) current expenses should be distinguished from expenditures for capital investment;
- (ii) accounts should be developed for determining the costs incurred by operational units so that they could be used effectively by management to achieve cost control and to detect which units and/or activities might require assistance in reducing costs.

In the instances where these recommended changes were made, the expected results ensued. In Panama and Yugoslavia, weak financial management was significantly turned around with an effective technical assistance program. In Bahamas, a successful training program led to the replacement of expatriates with qualified Bahamians. This is not meant to imply a direct correlation between recommendations and results, but suggests that recommendations should be carefully tailored and phased in accordance with the institutional capacity of the enterprise.

Failure to achieve improvements was frequently attributed to continued shortages of technical and professional staff. Somalia, for example, had to defer introducing a commercial accounting system because of staffing shortages. Countries facing critical manpower constraints may have to continue to rely on expatriate assistance, at least in the medium term when these problems could be relieved.

Water enterprises must seriously address incentives' problems if they are to retain competent staff. Non-competitive salaries undermine staff morale and the quality of operations suffer. Turkey provides a classic example of the effect of low staff morale among key personnel leading to low output:

A 1970 Personnel Law established lower salary scales for technical staff while increasing wages and fringe benefits of semi- and un-skilled workers. This led to the freezing of salaries of technical staff during the 1970s, a period of high inflation, while non-professional staff secured substantial increases. Morale suffered as did the quality of technical staff, likewise operating efficiency continued to deteriorate.

Another problem is management preference for investing in new construction and expansion rather than undertaking system rehabilitation or cost reduction measures. Investment choices based on unsound technical criteria result in overestimation of demand, excess capacity and further system losses. Under these conditions, even if internal management were strong, unit costs would be too high to achieve meaningful rates of cost recovery without subsidy.

Still other difficulties have their origin in the socio-political environment in which water authorities operate. In Turkey, where the water enterprise's accounts receivable position worsened from US\$9 million to US\$44 million over an eight-year period, a major contributing factor was the existing difficult political and economic period which hindered the agency's ability to pursue collections rigorously. In Jamaica, not only did the Government fail to pay its bills on time, but it was unwilling to process tariff approvals during a politically unstable period of the economy. In India, water revenues remained depressed because of the interlinkage of the water tax surcharge with broader rent control legislations.

### RURAL EXPERIENCE

The 19 rural cases were mainly small independent systems with handpumps or diesel pumps on boreholes serving communities ranging from 230 to 1200 persons. The available evidence is more limited on the rural cases than on the urban cases.

### Instruments

In the majority of the rural cases, the principal instrument used was a flat rate. In Bondeni, Kenya, all households must pay a flat rate regardless of whether or not they are connected to the system. In rural Sierra Leone, a flat rate is levied on properties located within 200 meters of a standpipe. In Nimba county, Liberia, a flat rate of US\$50 per pump/year is required from each village (approximately 250 persons); the proceeds are deposited into a maintenance fund managed by farmers' development associations. In China, flat rates are used in combination with volumetric tariffs in places where metered connections exist.

In most cases, the rates were low. Rarely were they based on careful estimates of costs and affordability. In some instances, most notably Tunisia and the Ivory Coast, there is a deliberate policy of cross-subsidizing rural consumers by urban.

Many systems expect local residents to contribute labor or materials, either in lieu of, or in combination with cash payments. This is particularly common in rural Africa, but it is found in other regions as well. In Gongola, Imo, and Kwara States of Nigeria, UNICEF (the sole agency to introduce cost recovery for rural water in these states) expects villagers to contribute in line with their perceived capacity. Villagers provide cement, sand and labor for construction of wells. They are also encouraged to assume responsibility for regular operations and maintenance in order to keep



recurrent costs low. In Koinadugu, Sierra Leone, in-kind contributions are combined with cash requirements. In Bangladesh, materials are furnished as a grant to a petitioning group (meeting site selection criteria); beneficiaries pay for handling and construction costs for handpumped plastic tubewells.

In principle, other instruments also are possible in rural areas, particularly in standpipe systems. Examples include:

- (1) standpipe users purchase vouchers from the water utility;
- (2) standpipe users pay cash on a per bucket basis;
- (3) standpipes are franchised to community associations.

In such cases, rates can be established by the water utility with sufficient margin to cover the cost of private concessionaires, community representatives and/or operators.

#### Amount of Revenue Collected

Full cost recovery was the stated goal in four of the nineteen case studies. The majority of countries sought partial recovery of operation and maintenance costs only.

Actual performance varied widely. In Yemen, villagers paid approximately two-thirds of total project capital costs, plus all the recurrent costs. In Mali and Nepal, village contributions covered recurrent costs but not capital costs. In rural Thailand, 31 of 45 local systems not only covered costs but also generated net profits. Even though rates were in some cases higher than in Bangkok, collections remained high; most systems were still financially viable ten years after construction.

Amounts collected in China cover operation, maintenance and depreciation. In addition, consumers pay upfront for as much as 80 percent of capital investment costs; county governments pay the balance. No central government financing is available. System expansion is funded by a revolving fund. This level of financial participation is associated with a strong sense of ownership and awareness of the importance of continuous maintenance.

In Kwale, Kenya, the village committee decided that families should contribute an amount equivalent to about US\$3 per year. The revenue actually collected, however, came to less than one percent of total project costs. In another part of Kenya, the Western Province, the revenue amounted to 20 percent of costs. Approximately two-thirds of the total sum due was in fact collected. This scheme was a pilot venture in an area where water previously had been regarded as a service that should be provided free.

In a UNICEF supported project in Bangladesh beneficiary communities contributed roughly 37 percent of total capital costs of handpumped wells. Villagers in a UNDP-supported project in Koinadugu, Sierra Leone eagerly contributed LE500 (roughly US\$100) in advance to pay for pumps. Villages in

Mali spent two percent of all village expenses on construction and slightly less than one percent for spare parts.

Thus the available evidence, while limited, suggests that rural communities do have the capacity and willingness to pay for water supply improvements, at least enough to cover a portion of the costs. In virtually all the cases reviewed where some degree of cost-recovery was achieved, communities contributed a combination of labor, materials, and cash for payment of pumps, steel, cement, and private contractors. Often, as in the Yemen, Mali, and China examples, consumers were willing to contribute upfront.

### Problems

Where rural water schemes fail, the underlying cause is often inappropriate choice of technology. Selection of excessively expensive approaches can be financially fatal. Under-designed systems can also be a problem, as a Thailand case illustrates:

An improvement project focussing on villages in the northern part of the country undertook initially to assure that each village was provided with a single well, centrally located. This strategy failed, however, because the villagers did not value the wells highly enough to contribute financially or otherwise to maintaining and sustaining them. A second approach was then adopted that provided for several standpipes dispersed around each village. Yet this too failed for the same reasons. Finally, a third plan was tried that brought yardtaps right outside the houses of most villagers. This succeeded. Even though the yardtap plan was much more costly, households were willing to pay because they valued the extra convenience of having water nearby.

The Thailand experience suggests that appropriate technology does not necessarily imply least cost technology; consumer preference and willingness to pay must also be considered in advance of project implementation.

The evidence suggests that when the right approach is used, cost recovery is achievable because consumers' sense of ownership, pride and responsibility is strong. Cases in China, Thailand, and Yemen demonstrate the positive effects of community awareness and participation. In Nepal, water facilities rapidly deteriorated due to lack of maintenance when the government/donor installed water systems using a top down approach with no community participation. Once the approach was changed to solicit active community involvement in design and implementation decisions, community attitudes altered dramatically.

Community participation is not easy to sustain, however. Unless well organized and led, local projects can be very inefficient and costly. Initial interest and motivation may wane; seasonal employment may interrupt

continuous involvement in the project. A community's contribution of voluntary labor must be encouraged and closely supervised. This can be done in several ways, including the use of village health workers (as is done in integrated rural development projects), village chiefs, or a capable promoter from outside the community.

### III. CONCLUSIONS

Achieving cost recovery objectives in the water sector requires that institutional, management, financial and operational problems receive greater attention. Effective leadership and tariff-setting mechanisms are essential. Appropriate technical solutions must be adopted that are consistent with consumer willingness to pay and population growth patterns, in order to avoid problems related to system overdesign, excess production, slow rates of connection, and low sales volumes.

Improved management procedures, including financial and accounting systems are often necessary. Monitoring of performance indicators is a critical step in improving management practices. The focus on tariffs and revenue enhancement should be broadened to include improved operational efficiency and reduction of costs. Better approaches are required for leak detection programs, system maintenance, billing and collection, and investment planning.

In several cases reviewed, cost recovery efforts did not produce enough revenue to fully cover total costs, or even operating costs alone. What revenue was available was neither collected in a timely fashion nor used effectively. In only seven of fourteen urban cases was full cost recovery deemed an immediate goal. The inevitable consequence of these tendencies was continued dependency on subsidies from higher level government authorities. Heavily subsidized systems were typically prone to more problems indicative of inefficient operations and management. Utilities end up cash poor with huge rehabilitation needs and limited potential for system expansion.

Many enterprises found the pricing policies and recommendations of donor agencies politically difficult to implement. An explicit tariff review process may provide an external check on utility operations, impartial analysis and rate-setting, and timely results. If the goal of self-sufficiency is to be achieved, then the tariff setting must be shielded from political pressures.

The rural case studies suggest that problems of short-lived assets and community apathy could be reduced and partial cost recovery could occur under the following conditions:

- (i) users are involved in choosing technologies, to the extent feasible, and are aware of the costs;
- (ii) projects are designed to require minimal governmental support and recurrent inputs;
- (iii) the least costly maintenance system is utilized; village knowledge, skills and experience are maximized for operation and maintenance;

- (iv) water supply financing and cost recovery arrangements are integrated into existing rural development financing mechanisms;  
and
- (v) water projects are integrated with broader rural development projects so that the benefits of clean, potable water can be reinforced.

ANNEX A

WORLD BANK POLICY ON COST RECOVERY IN WATER SUPPLY

The World Bank's policy on public sector pricing is outlined in its Operational Manual Statement 2.25, "Cost Recovery Policies for Public Sector Projects." This policy recommends a two-step approach to prices that maximize a project's net economic benefit. In most cases, the price should be set equal to the current economic cost of producing the last unit sold plus a mark-up, if needed, to clear the market.

The estimates of efficiency prices should be derived from information about the demand for and supply of water. Except where rationing is necessary, the estimates can be determined straightforwardly from domestic production costs, suitably adjusted to reflect the opportunity cost of inputs such as imported equipment or unskilled labor. Efficiency prices depend on long-run, rather than short-run, marginal costs, although in many cases average incremental cost (AIC) serves as a quantitative approximation of long-run marginal cost (LRMC).

Externalities, such as those relating to health or environmental concerns are typically not incorporated in tariff calculations for Bank projects, due to the extreme difficulty of estimating them. If externalities are included, the efficiency price will be somewhat below the LRMC, in order to induce the economically optimal level of individual consumption. Actually, the relationship between tariffs and LRMCs varies widely, particularly in those situations where initial demand estimates are known to have been exaggerated.

For step two, when the efficiency prices are adjusted to take into account such non-efficiency objectives as financial viability and service levels to the poor, the following must be considered:

- (i) The financial objectives of the utility;
- (ii) Government's fiscal objectives and operating constraints; and
- (iii) The country's income distributional objectives.

Efficiency prices, for the most part, are high enough to yield an average revenue that satisfies financial targets. Thus, there often is no conflict among at least some of these multiple objectives. However, if conflict should occur, then trade-offs will depend on the value of the additional public revenue relative to the value of higher (after tax) income to beneficiaries.

Insofar as consumption of water roughly parallels income, LRMC adjustments for income distributional objectives should generally take the form of subsidies (or lifeline rates). Adjustments for financial objectives are, usually, reflected in the rates of return on assets or the cash generation targets. Bank policy, over time, appears to have given greater emphasis to calculation of LRMCs than to income distributional and fiscal objectives.

ANNEX B

CASE DESCRIPTIONS

URBAN

1. Bahamas

Sector Financing Policy:

The sector financing policy was not well enunciated. The water tariff structure charged progressively higher rates over three consumption levels. Although the charges were relatively high, they did not cover operating expenses.

Sector Organization:

The Bahamas Water and Sewer Corporation (WSC) managed water resources development in the country.

Cost Recovery Goals and Accomplishments

The WSC was expected to establish a sound financial basis which would enable it to recover full costs. ~~through~~ The following ~~measures~~ (i) an improved accounting system which segregated accounts (operating costs, assets, revenues) between its urban and rural activities; and (ii) raise <sup>ing</sup> average tariffs regularly to cover operating deficits and to provide an adequate rate of return on revalued fixed assets.

*procedures were recommended*

Production shortfalls below demand, low sales volume (because of rationing due to delays in construction), and high unaccounted-for-water kept WSC from achieving its cost recovery targets. A program of leak detection and repair, full metering and system rehabilitation failed to reduce unaccounted-for-water from its persistent high level of 44 percent.

The net result of the foregoing is that instead of generating an operating surplus, WSC posted a cumulative loss amounting to US\$6.3 million in six years. Its operating deficit was covered by the Government in the form of equity contributions and grants.

Tariffs were increased regularly as required. By 1982, the average tariff stood at US\$2.43/m<sup>3</sup> which was one of the highest in the region. Nevertheless, the project's cost recovery objectives were compromised due to inadequate production capacity, and the inability to reduce unaccounted-for-water. WSC was also unable to comply with covenanted financial targets.

2. Colombia

Sector Financing Policy

In general, sufficient revenues were to be collected through valorization charges and tariffs to achieve full cost recovery.

### Sector Organization

The National Institute for Municipal Development (INSFOPAL), a decentralized Government agency within the Ministry of Health was in theory in charge of overall sector planning. In practice, however, services were provided by municipal enterprises, most especially EMCALI.

### Cost Recovery Goals and Accomplishments

Prior to donor intervention, EMCALI's staffing ratio of 7 employees/1,000 connections was considered adequate. Its accounting practices and procedures were satisfactory, but budget controls were weak. EMCALI had long experienced serious financial difficulties caused by: (i) low water sales due to slow growth in demand; (ii) high operating expenses caused by inflation; (iii) delayed and insufficient tariff increases; and (iv) cost overruns in projects then being implemented.

To correct its operating deficiencies, EMCALI was advised to bill and collect all valorization charges in order to avoid problems of delayed payments from other government agencies which shared the billing and collection function. Problems frequently occurred when separate agencies were involved in billing and collecting. For example, EMCALI received only 47 percent of its valorization billings in March 1981.

Gradually, EMCALI's staffing ratio grew to 8 per 1,000 connections, which was unsatisfactory, as this represented a 40 percent increase in staffing during a four year period. The volume of water sold grew very slowly as fewer new additions to the system were authorized. Low volume of sales coexisted with (i) high levels of unaccounted-for-water (38%) because of illegal connections in low income areas; (ii) large increases in operating expenses due to a growing wage bill; (iii) inadequate tariff increases; and (iv) depressed revenues from valorization charges, all of which led to EMCALI's failure to recover operating expenses.

### 3. Ecuador

#### Sector Financing Policy:

Sector development has been financed by international loans, suppliers' credits, central government and net internal cash generation of autonomous municipal entities "Empresas." No clear policy became apparent from a review of the documents, but the major sector agency was financially in a satisfactory position. Revenues generated within the sector covered operation and maintenance, but were inadequate to cover depreciation or to earn a rate of return on net fixed assets. Shortfalls were financed by taxes and municipal contributions. The Government's goal, however, was to encourage EMAP (a sector agency) to obtain all its revenues from the sale of water and related charges.



### Sector Organization

EMAP was an administratively independent municipal entity responsible for supplying water to Guayaquil and the Guayas Province. It owned its assets, prepared its budget, generated its own funds and was authorized to receive financial assistance from other sources. Tariff adjustments were prepared by EMAP for approval by the Ministry of Finance.

### Cost Recovery Goals and Accomplishments:

EMAP covenanted to set tariffs to provide rates of return of 2 percent in 1974 and 1975; 6 percent in 1976-79; and 8 percent thereafter.

EMAP was unable to achieve its targetted goals because of a combination of (i) high construction costs; (ii) low demand; and (iii) actual unit operating costs much higher than revenues. The growth in new water connections fell 33 percent short of estimated projections because the data base for population estimates overstated total population in the service area by almost 20 percent. At the same time service levels were grossly understated.

*and exceeded initial forecasts*

The average tariffs were higher ~~than forecasted~~ (35 percent in real terms as opposed to 25 percent) and this helped to offset the decrease in volumes sold. But higher than estimated operating costs/m<sup>3</sup> kept the company operating with annual losses and low cost recovery ratios. Much of the unit cost increases resulted from unexpected growth in staffing. For example, an additional 120 employees were added to EMAP's payroll in one year.

Persistent high levels of unaccounted-for-water were also responsible for low annual cost recovery ratios. EMAP did take steps to reduce its system losses by training staff in leak detection and metering. The agency made impressive strides in increasing the percentage of metered connections from 64 in 1973 to 94 percent in 1984, but was, however, unable to keep pace with meter maintenance and repair needs.

## 4. India

### Sector Financing Policy:

The State of Uttar Pradesh has had a broad policy framework for financing water supply and sewerage projects for many years. Its application in practice has been very uneven. Under this policy urban water supply projects were to be financed through loans and local authorities were encouraged to recover costs. Recovery was to be sufficient to finance expansion and provide cross subsidies for poorer and less viable systems. Rural schemes were grant-financed.

### Sector Organization:

A two-tiered structure managed the sector's financial operations.

### Cost Recovery Goals and Accomplishments

The overseeing agency, Nigam, was to ensure the financial viability of the local authorities by encouraging them to make necessary tariff and tax adjustments.

Self-sufficiency never materialized because the local authorities were unable to raise enough capital through tariffs and taxes to cover operations. It was difficult to determine the financial performance of these agencies because of their failure to produce reliable operating or financial information. These agencies, however, continued to rely on the Government for varying degrees of operating subsidy. Several factors have been reported as contributing to the financial dependence of these supply authorities.

- (i) there was significant political opposition to increases in tariffs and hence tariff increases were negligible.
- (ii) water and sewer charges were, in most cases, linked with other municipal taxes which made it difficult to effect rate increases.
- (iii) Municipal taxes, in turn, were linked to rent control legislations which further limited the base on which taxes could be assessed.
- (iv) Delays in project implementation, as well as unforeseen price escalation, increased the cost of operations which required even larger tariff increases to break even.
- (v) low income levels, particularly among the rural population, limited the tariff potential.

Various recommendations were made to improve operational efficiency (improved billing and collection, accounting, metering and meter maintenance, leak detection, etc.), but these failed to bring about expected changes largely because of the prevailing administrative philosophy which did not appreciate the importance of operations and maintenance and its relationship to costs and revenues.

### 5. Jamaica

#### Sector Financing Policy:

In principle, sector agencies were responsible for their financial viability.

#### Sector Organization:

Sector organization had long been ill-defined; a myriad of agencies were involved, including the Water Commission of Kingston-St. Andrew (KWC), the National Water Authority (NWA) and 13 Parish Councils. In addition, the

Water Resources Department (WRD), under the Ministry of Mines and Natural Resources, provided advice on surface and groundwater development. Private entities also were involved in water supplies for agriculture and industry in Kingston.

#### Cost Recovery Goals and Accomplishments

The Water Commission (KWC), a semi-autonomous organization created in 1937, was operating with serious institutional constraints, among which were low salaries; overstaffing at the lower levels and weak engineering and administrative departments. All had a negative impact on operational efficiency and cost recovery. Its financial position was weak stemming largely from KWC's neglect to (i) reduce operating costs; (ii) revise tariffs regularly; and (iii) reduce its accounts receivables.

Actual revenues were unable to keep pace with cost increases, primarily because of: (i) Government's delay and reluctance to approve tariff increases in an environment of high inflation; (ii) KWC's weak collection efforts; the level of sales in accounts receivable stood at 6 months by the end of 1982, most of which was due from consumers in certain inner city Kingston areas, but more significantly, the Government failed to pay its bills on time.

Other related problems affecting KWC's cost recovery performance were (i) lower-than-anticipated sales largely due to the effects of the economy's recession on commerce and industry; (ii) slow rate of water connections due to changes in urban development patterns; and (iii) fewer-than-expected sewer connections.

The KWC was also affected by certain external factors, including a severe drought which forced Government to ration water supplies. Some consumers refused to pay their bills or to allow their supplies to be rationed, and this further increased receivables.

KWC also failed to adopt recommended operational procedures which could have improved its revenue position. Source meters were left uninstalled making it increasingly difficult to estimate the volume of water produced. Maintenance was negligible and unaccounted-for-water was estimated at 31 percent.

Staffing remained a critical problem as the KWC was unable to recruit and retain qualified technical, administrative and managerial personnel because of non-competitive salary scales. At the same time, KWC was overstaffed at the lower unskilled levels. Reduction in force was politically unpalatable because of high unemployment in Jamaica and union pressures. There were 20 employees per thousand water connections in the Kingston Metropolitan area in 1983. The result was that KWC had to (a) defer payments on debt service and accounts payable and (b) increase its long term borrowing to remain financially solvent.

## 6. Pakistan

### Sector Financing Policy

The provision of water supply is primarily a local function administered and controlled through budgetary provisions determined at the provincial level. Capital investments and recurrent costs were highly subsidized; cost recovery from users was low.

### Sector Organization:

A semi-autonomous Water and Sanitation Agency (WASA) was created in 1976 to operate the water supply, sewerage and drainage systems within the city of Lahore. WASA had its own Managing Director; the power to operate the water supply, sewerage and drainage systems within the city of Lahore, and maintenance of its own funds and accounts.

### Cost Recovery Goals and Accomplishments

WASA from the beginning was in very poor financial condition. It had huge annual operating losses caused by a combination of low tariffs, high operating costs and lack of proper maintenance. Low billing and collection efficiency resulted in accounts receivable of more than one-year billing.

In order to ensure financial viability, agreements were reached that included a restructured tariff by January 1, 1977. In addition, WASA agreed to improve its billing and collection system so that outstanding receivables could gradually be reduced to 15 percent of annual billings by 1982. Furthermore, WASA covenanted not to incur additional long-term debt.

WASA's financial performance worsened and the agency was unable to achieve its goals. Based on the strategy incorporated in an Operational Action Plan, the entity's performance began to change dramatically in the ensuing years. The Plan involved a tariff adjustment; more rigorous pursuit of illegal connections; zoning distribution to reduce system losses and waste; and changing customers from a billing system based on a percentage of property value to metering.

Its financial targets were met. In 1985 revenue was slightly less (4.4 percent) than projected mainly due to a shortfall in the property tax and miscellaneous income. However, its operating expenses were also lower by 3 percent. Reductions in operating expenses were facilitated by close scrutiny of technical staff to inefficiencies as a result of the Action Plan. WASA was also able to achieve a satisfactory rate of return of 4.8 percent which exceeded the requirements of the Action Plan.

## 7. Panama

### Sector Financing Policy:

The main sector agency financed its recurrent costs through governmental subsidies. Water rates had been unchanged for 20 years.

### Sector Organization:

IDAAN, a national water supply and sewerage authority, was established in 1961 as an autonomous government agency headed by an executive director. A seven-man Board of Directors provided policy guidelines and made major operating decisions. Weak sectoral planning resulted in (i) overstaffing; (ii) overlapping of responsibility; (iii) inadequate billing and collection; (iv) improper accounting and reporting practices; and (v) inadequate planning and budgeting.

### Cost Recovery Goals and Accomplishments:

IDAAN'S capital requirements were to be partially generated internally; 38 percent of its investment program was to be covered. Its recurrent costs were to be recovered from revenues earned from sales, connections and valorization charges.

To achieve its cost recovery objectives, IDAAN first had to reduce arrears, most of which were owed by public sector agencies, increase its water rates and improve its operational efficiency including its billing and collection practices. Toward this end, IDAAN agreed to increase water rates and charge a valorization tax to cover investment in distribution facilities.

IDAAN'S cost recovery performance was satisfactory. The volume of water sold was 39 percent higher than forecasted, likewise connection exceeded estimates by 31 percent. A new computerized billing system also helped to keep better records of sales. IDAAN was also plagued with high levels of unaccounted for water (36% in 1982), slow pace of metering, and a delayed leak detection program, but management initiative kept the institution financially viable. IDAAN reduced its staffing ratio from 20 employees per one thousand connections to 14; revised tariffs regularly; and pursued vigorous collection efforts.

## 8. Somalia

### Sector Financing Policy

Self-financing of sector operations remained a long-term goal of the Somali Government.

### Sector Organization

Responsibility for the sector was shared by several central government organizations and local public utilities, including the Mogadishu Water Agency (MWA), the executing agency under the project.

### Cost Recovery Goals and Accomplishments

MWA aimed at establishing and maintaining tariff levels at a rate adequate to cover cash operating expenses and depreciation or debt service, whichever was higher.

Based on qualitative statements (because no financial statements were produced), MWA was unable to attain its cost recovery target. Water tariffs were raised twice in six years, but Government chose to maintain regressive uniform tariff rates which yielded insufficient funds to offset rapidly growing expenses. MWA's cash position was particularly affected by high fuel costs during the 1970's; its accounts receivable position was relatively high, varying between 60 and 120 days. It is noteworthy that half of MWA's accounts receivable were due from Government, its largest customer. No emphasis was given by MWA to measures to enhance operating efficiency, such as strengthening of metering, billing and collection.

#### 9. Sri Lanka (CrS 709 & 1041)

##### Sector Financing Policy

The government financing policy for the sector gradually changed from one in which water was regarded as a free good to one in which a system of specific charges were to be levied for both water and sanitation. The eventual structure had to await the results of a tariff study, but a progressive rate structure was envisaged providing protection for the poor through internal subsidies.

##### Sector Organization

The WDB derived its revenue primarily from the bulk sale of treated water to local authorities which had the final responsibility for its distribution to the ultimate consumer.

##### Project Cost Recovery Goals and Accomplishments

WDB agreed to establish a tariff which would generate sufficient revenues to cover operating expenses and debt service and to gradually finance a portion of its capital investment from internal cash generation. WDB also covenanted to achieve positive financial rates of return of 5 to 7 percent during 1978 to 1982. These targets were not achieved, however, largely because of high operating deficits incurred by WDB which led to some 60-90 percent of its revenues having to be covered by central government subsidies.

One of the more serious problems arising out of WDB's cash flow shortage was its diversion of capital funds intended for its construction program to cover operating expenses. Some 20 percent of its operating expenses were estimated to be covered by capital funds in 1983.

The basic causes of WDB's poor financial performance were attributable to: (i) inadequate tariffs and the failure to revise tariffs when needed. Prior to 1984 tariffs were not increased in seven years; and (ii) ineffective billing and collection. It was only in late 1983 when a Financial Recovery Program was instituted that WDB seriously began implementing measures to contain costs and reduce its large operating deficit. WDB then undertook an accelerated comprehensive consumer metering and meter repair program; improved staffing in the areas of management and finance through training; improved its accounting and financial management systems; increased water tariffs; and enhanced its operations and maintenance.

By 1985, the Financial Recovery Program started to yield positive results: (i) the metering program in Greater Colombo was successfully completed; (ii) WDB started priority billing of high usage consumers; (iii) WDB identified large arrears owed by governmental agencies and began taking steps to recover its due payments. The net result of these steps was that WDB began collecting about 50 percent of its billings, which, although it covered only about 25 percent of its total operating costs (including depreciation and interest charges) represented a marked improvement over its performance in 1983 when only some 5 percent of operating costs was recovered.

## 10. Syria

### Sector Financing Policy

The Government encouraged sector agencies to be financially self-sustaining and contribute to its future investment program.

### Sector Organization

The EPEA established in 1975 was a semi-autonomous authority responsible for water supply in Aleppo.

### Cost Recovery Goals and Accomplishments

EPEA's cost recovery targets called for adjustment of tariffs and associated charges to ensure net revenues sufficient -- after covering operating expenses other than depreciation, reasonable increases in working capital and debt service -- to finance 15 percent until 1982 and 35 percent thereafter of its investment requirements over a three-year period.

The basic tariff per cubic meter of water consumed remained unchanged which did not help conservation and actually resulted in higher-than-expected consumption. Financial management was less than desirable as accounts receivable soared at the equivalent of 10 months of sales. The total volumes of water produced and sold were 12 and 7 percent higher than foreseen at appraisal. Unaccounted-for-water also was high.

The net effect of the afore-mentioned financial and operational results was that net internal cash generation provided only about 2 percent of total investment requirements as compared with a projected 25 percent. EPEA had to substantially increase its borrowing to service part of its debt.

## 11. Tunisia

### Sector Financing Policy:

The sector was subsidized by the Government as its organizational structure evolved.

Sector Organization:

Prior to the creation of ONAS the prime responsibility for sewerage had been with the municipalities which lacked the funds and personnel to provide services efficiently.

Cost Recovery Goals & Accomplishments

ONAS was required to obtain a rate of return on its net fixed assets in excess of 4 percent. The tariffs, connection charges and charges connected with the property tax were to be established at levels that would enable ONAS to accomplish its rate of return goals.

ONAS' cost recovery performance was satisfactory although it was beset with operational problems characteristic of poorly run institutions, viz, lower than anticipated volumes sold, depressed revenues, combined with much higher than anticipated expenses, largely personnel costs. ONAS also had a problem with maintaining its receivables below 3 months of sales because of delays in funds transfer from SONEDE, the collecting agency. But several positive factors helped ONAS overcome its operating and financial difficulties which led to good cost recovery results: (i) the government provided ONAS with funds to finance the installation of house sewerage connections and extension to low income customers, thereby fostering connection to the system; (ii) ONAS' financial accounting and management were good which provided critical information to anticipate and plan ahead; and (iii) staff were continuously trained and highly motivated.

12. Turkey

Sector Financing Policy:

The Government encouraged sector agencies to be financially self-sustaining and contribute to its future investment program.

Sector Organization:

Responsibility for water supply and sewerage services was divided among various authorities: ISI (a semi-autonomous agency of Istanbul municipality), the General Directorate of State Hydraulic Works (DSI) and a collection of municipalities. By 1981, however, the sector's organization was streamlined with the creation of one regional water supply and sewerage authority.

Cost Recovery Goals and Accomplishments:

Revenues were to be sufficient to produce an annual rate of return on revalued assets in service of at least 7 percent for the FY72-76 period of its construction program and 8 percent thereafter.

ISI was unable to meet its cost recovery target. It incurred very high losses such that instead of generating cash, operations drained away some



\$12 million equivalent in ten years. ISI's expenses consistently exceeded its revenues. Low water sales and high unaccounted-for-water worsened its financial results. A lumpsum tariff increase (56%) in March 1974, did little to improve cost recovery but rather exacerbated ISI's cash flow position as consumers resisted the huge increase.

More serious problems exogenous to the institution's control added to ISI's financial problems. First of all, the decade of the seventies was a period of difficult economic and political circumstances in Turkey. High inflation had the dual effect of escalating ISI's operating expenses, particularly its personnel costs, while at the same time making it politically difficult to obtain Government approval of tariff increases required to meet covenanted financial and operational targets. Its many requests for tariff increases were denied because of Government's efforts to rectify overall macroeconomic conditions (through price stabilization), but also because Government was critical of ISI's failure to improve its high level of unaccounted-for-water which had levelled at 44 percent of production.

ISI thus found itself in a vicious cycle of low operating efficiency, on the one hand, and its inability to obtain approval to increase the tariff which would help in improving operating efficiency. Moreover, ISI failed to institute recommended steps which would have helped it to contain costs and enhance its revenue generation: (i) procurement of production meters; (ii) installation of water meters for individual connections; (iii) replacement of some distribution pipes; and (iv) a comprehensive leak detection program.

ISI's poor accounts receivable position peaked at \$43.75 million in 1981. Government and the municipalities accounted for only one third of these arrears. The implication here is that the remaining 66 percent could have been collected from private consumers if ISI had adopted aggressive collection procedures such as the automatic attachment of a property lien for non-payment. Once again, however, the political environment made it difficult to resort to such actions, leaving ISI with virtually no effective means to recover arrears. Operating deficits had to be financed higher levels of municipal tax transfers (\$33.2 million equivalent) where only a nominal amount had been anticipated.

### 13. Yemen Arab Republic

#### Sector Financing Policy:

The Government encouraged the application of a tariff which would cover all water and sewerage expenditures and eventually generate cash surpluses for financing future investments.

#### Sector Organization:

The National Water and Sewerage Authority (NWSA) was established in 1973 as an autonomous agency to develop and operate urban water supply and sewerage facilities, superseding a fragmented institutional system.

Project Cost Recovery Goals and Accomplishments:

NWSA covenanted to raise revenues to levels required to achieve by 1978 a positive rate of return on its net fixed assets in operation and to a gradual increase thereafter in order to achieve a rate of return of 5 percent by 1984 and 7 1/2 percent by 1987.

NWSA was in compliance with the above targets up to 1980 but failed to comply thereafter. Its cost recovery ratio increased steadily from a low of 39 percent in 1975 to 124 percent in 1979. In 1980 the ratio started falling from 110 percent down to 73 percent in 1982 when revenues grew much more slowly than projected and operating expenses multiplied some 15 times due to general price increases in YAK during that period.

NWSA's cost recovery position was determined largely by a series of intra- and extra- institutional events including: additional assets and works in progress it had taken over during 1975-81; substantial increases in operating expenses and simultaneous decreases in tariff yields; slow rate of sales as the consumer mix changed; delinquent payments from government agencies; and diminished and intermittent supplies as the water table declined.

14. Yugoslavia

Sector Financing Policy

Revenues from water and wastewater charges were to be sufficient together with revenues from the operation of water supply service to cover all operating and administrative expenses, including depreciation, and taxes.

Sector Organization

The Dubrovnik Water and Wastewater Enterprise (Vodovod Dubrovnik) was the principal agency serving Dubrovnik.

Cost Recovery Goals and Accomplishments

Vodovod Dubrovnik covenanted to pursue several financial targets which would allow it to cover from water revenues its operating and administrative expenses including depreciation. These targets were in the form of financial covenants, viz: (i) revenue; (ii) cash generation; (iii) rate of return; (iv) debt service; and (v) accounts receivable.

All of the financial covenants were complied with. Timely tariff increases at levels high enough (10 to 30 percent each year since 1975) to minimize the effect of high rates of inflation contributed to Vodovod Dubrovnik's success. But this measure was reinforced by the entity's good institutional characteristics, including adequate staffing (both in numbers and skills), efficient accounting systems and adherence to sound financial policies and procedures.

It is noteworthy that the period under review, 1975-82, was highly inflationary which led to operating and investment costs growing much faster than revenues. In 1982, for example, total actual revenues were 17 percent higher than forecast while total actual expenses were 91 percent higher. High operating costs (particularly personnel costs, which characteristically increase rapidly during inflation) dramatically altered the entity's financing plan but had minimal effect on overall cost recovery performance.

Tariffs were well administered, financial management was strong, the entity operated with low receivables (less than one month of sales at the end of 1982), and the technical aspects of operations were well managed as the level of unaccounted-for-water remained in an acceptable range of about 30 percent.

## RURAL

### 1. Thailand

The project was implemented from 1966 to 1972 by the Ministry of Public Health (MOPH). The water system installed in each community consisted of a water treatment plant with storage tower and piped distribution system. Systems were installed to serve two types of communities: villages and rural market towns.

Communities were selected for this project based on willingness to assist in construction and to pay for operation, maintenance, and future expansion. Villagers made direct financial contribution or self-help while rural market towns contributed indirectly through taxation.

An ex-post study ten years later revealed that most of the systems (45 out of 52) were still functioning. Most were financially self-sufficient, with users paying full costs of maintenance and operation. Of the 45 working systems, some 31 were operating at a profit while only four had deficits and had to be subsidized. After meters were installed, however, there was a significant reduction in the volume of the annual losses. Water rates ranging from 2 to 5 baht per cubic meter were higher than existing rates in Bangkok but were acceptable to users of the systems. Local communities even developed over the years a diversity of effective and innovative financial and operational strategies including credit plans and water-sharing schemes.

Initially, public taps were provided under the scheme to ensure community-wide access to piped water. Flat fees per household or person were applied. While this option provided access to everyone not enough revenues could be collected to sustain operations because of delinquent payments in some communities. Consequently, most systems were changed to metered private connections and many public taps were closed. This change to individual connections significantly altered the revenue generating capacity of the systems which suggest that households were willing to pay as long as the level of service was valued by them. Additional revenues generated by this change allowed further expansion into areas previously unserved.

Successful village water systems in Thailand have been characterized by a set of non-technical characteristics including: initial community contribution of time, labor and funds; training and subsequent support for local operators responsible for maintenance; willingness to pay for a level of service communities valued; and the gradual evolution, on a community-by-community basis, of viable water rate structures.

2. Kenya (Kwale)

The project has so far supplied about 100 pumps serving 25,000 people in rural communities throughout Kwale District with provision of clean and sufficient drinking water. Total project costs were estimated at Ksh 60.5 millions of which the communities provided an upfront contribution of Ksh 0.6 million. Community participation was sought in all aspects of the project, from initiation and planning, to water point siting and construction and then long-term operation and maintenance. Beneficiaries were expected to contribute to the water system in cash, labor, material, leadership, etc, which is in line with the Government's policy of cost-sharing.

All the villages were required to form water committees which collected funds for the maintenance of pumps. The committees decided on the amount each family should contribute. Villagers generally contributed approximately one shilling (US\$0.06) per family each week (i.e. US\$3 per family per year). This implies a potential annual total of \$150 per pump, assuming high collection efficiency and a 50 family user group. To the extent that a high level of collection efficiency does materialize in the project area then the project would achieve full recovery of both capital costs and recurrent costs. The assumptions made in the above calculation included: (i) the cost of installed pump of \$500 for a 30 meter depth, excluding the cost of the well, (ii) a 10 year pump-life and 12 percent interest rate, and (iii) an annual maintenance cost of \$50 (to include parts and labor).

3. Kenya (Western Province)

In March 1981, the Government of Kenya supported by the Government of Finland launched a program to serve 165,500 persons through 730 handpump wells and protected springs and piped water supply schemes. Community participation was expected during all phases of the wells program to gain commitment to pay for operation and maintenance. At the planning stage, well committees were involved in siting of wells. During implementation, wells were dug by the well committees up to the water table and completion done by contractors employed by the project. User communities were expected to pay full costs for handpump maintenance.

Well committees were expected to collect KSh 1,000 (\$60) and hold it on account for pump repairs. Initially this target was not achieved. Out of a total of KSh 87,000 expected to be collected from 87 well committees less than 20 percent was actually recovered. A pilot scheme implemented subsequently to test willingness to pay indicated that users were indeed willing and able to pay the required costs. Of a total repair price of KSh 10,124, cash collection for the first quarter of 1985 was KSh 6,700, with an

outstanding balance of KSh 3,324. This represents a collection performance of 66 percent -- a relatively high figure for a pilot venture.

4. Mali (South)

This project initiated by the Government of Switzerland in 1977 planned to construct 300 productive boreholes equipped with handpumps. By July 1983, some six years later, a total of 320 were installed.

To attain the project's stated goals of full cost recovery for operations and maintenance, the following steps were taken: (i) HELVETAS selected the Vergnet pump which is relatively light and simple to use; (ii) community groups were informed and organized early in the project cycle; (iii) villagers were required to pay upfront part of the initial costs of the handpumps, cement and a one year maintenance contract; and (iv) arrangements were made for purchase and storage of spare parts at the regional level.

A decentralized system of storage and distribution of spare parts together with price controls by the project department helped keep supply available and costs low. The existence of a Vergnet representative in Mali also facilitated the availability of spares and smooth functioning of the maintenance system.

5. China

The virtual absence of central government financing for rural water supply distinguishes China from most other developing countries. Rural water supply systems usually serve and are owned and operated by individual villages, with technical backstopping provided by townships and counties. Townships and counties are also repositories of materials and spare parts, which helps to simplify and reduce the cost of maintaining inventories.

This information taken from a World Bank Staff Appraisal Report demonstrates how rural water supply projects are conceived and implemented to minimize costs and achieve maximum cost recovery.

The project was designed to serve 5.9 million persons in 25 counties dispersed in some 11,827 villages (average population of about 1,200) with piped water through house connections and public standpipes, handpumps and rainwater catchment tanks.

Of the total financing of \$210.2 million the villages were to provide upfront contribution of 40 percent. In addition, loans extended to them by the provinces and counties were to be repaid. Beneficiaries were also required to pay the full costs of operation and maintenance. These requirements are close to the standard requirements for village water supply in China.

Two of the poorer provinces, unable to meet these costs, were to get assistance from the World Food Program. Under this arrangement, WFP would provide food aid in the form of wheat valued at \$10.5 million to partly pay villagers for their work in the project.

It was estimated at project appraisal that capital and operating costs of rural water supply systems in China were considerably lower than those in other developing countries because the facilities provided small volumes of water, villagers contributed labor and materials, wages and other expenses were low as waterworks operations were integrated with other village activities. The main operating expenses for piped water systems were power (30-40% of costs) and materials and maintenance (20-30% of costs). Labor represented less than 20 percent of total costs. The remaining expenses were for chemicals and administration.

For village waterworks systems the village accountant, working part-time, kept records of receipts, payments and inventories on behalf of the waterworks entity. For larger systems serving several villages, accounts were kept at the waterworks office by full-time accountants. The accounting system provided inter alia the information generally used for determining annual fund requirements and the payment of bonuses to workers.

The methods of charging for water in rural water supply systems varied. For metered household connections, which is rare in China, villagers pay per cubic meter rates decided by the village (or the county or township). The rates are normally progressive, increasing with usage, and higher for commercial and industrial uses. For unmetered service (public standpipes or unmetered house connections) a monthly rate per household or person is normally charged. Such charges are sometimes collected from individuals by the rural waterworks, or more commonly paid for out of the village funds (from undistributed earnings of agricultural and business activities). In general, the amounts collected cover the costs of operation and maintenance and, sometimes, a small amount is set aside for depreciation.

To increase the financial resources for rural water supply, the project would set up provincial revolving funds (PRF) in each project province. The PRFs would then be used to finance additional subprojects.

At the time of project appraisal, the government and World Bank staff were confident that the facilities constructed by the project would be sustained because the villages paid for the bulk of the capital cost; villagers participated in the planning process including financial planning; they knew in advance what their financial obligations would be, and had the power of veto, to request redesign for lower cost or request a longer loan payment period. Safe and reliable water is highly valued in China; and there is a keen sense of upkeep and pride at the village level. Systems were generally well operated and maintained and this could be attributed to the communities' willingness to pay the bulk of the cost in advance.

#### 6. Yemen

The project financed by the GTZ and OXFAM in corporation with the Yemen Ministry of Agriculture served four villages in the Al Boun area. The Ministry of Agriculture's Rural Water Supply Department did not have a budget to finance new water supply schemes. Villages were informed that they would have to bear all the costs involved during the initial period of spring

development Villagers' contribution usually amounted to about one-third of the total cost of a scheme's labor, materials, steel and cement. The water department then provided technical advice/supervision as well as lending equipment such as a small hand compressor drill and a section pump to facilitate digging. On the basis of the villagers' initial work and involvement, a proposal is then written and submitted to potential donors for funding.

The schemes had basically the same technical features; an electrical suction pump with a lifting head of 130-150m and a diesel powered generator. One scheme is gravity-fed. All the equipment required was bought from local traders.

An impact evaluation one and one-half years later revealed the following reasons for the project's achievements:

- o Despite some difficulties in organizing, operation and maintenance at the beginning, the villages agreed on how much to pay monthly and who is would be in charge of the scheme. Every household paid a small average fee; the two persons in charge of the system received a monthly salary; and after deducting diesel costs, a contribution was made to the cooperative's fund.
- o Villagers provided voluntary unskilled labor, materials (sand, gravel, stones) and paid for skilled labor (mason, carpenter) and transportation.
- o The Local Development Association covered 2/3 of the cost of the pipeline and paid for cement.
- o The funding agency, financed the pumping unit, 1/3 of the pipeline, wood, steel and accessories.
- o The Ministry of Agriculture and GTZ supplied technical assistance and construction equipment.

On the average, the total project costs were divided accordingly:

Village (300-500 inhabitants)	68%
Local Development Association	08%
Donor	24%

This case demonstrates that as long as certain preconditions exist a village could achieve high levels of cost recovery. These include:

- (a) the possibility of organizing a village water co-operative covering several scattered villages;
- (b) villages belonging to the same tribal unit;
- (c) close supervision and a stimulation of villagers willingness to pay and participation;

(d) the availability of technical assistance.

7. Kenya (Tetu Thegenge)

The Tetu Thegenge project implemented by the Ministry of Water Development (MWD) was designed to serve 76,000 persons. This example serves to illustrate the difficulty in recovering costs when villagers are not "willing-to-pay". Traditional sources of water were rivers which flowed even in the dry season.

The average travel distance to one of the rivers was one mile. Water quality was poor because the rivers had a high silt load.

This gravity system constructed by MWD delivered river water to individual connections. The majority of households were charged a flat rate of about 15KShs per family per month. Payments were erratic however and operations and maintenance costs were not recovered. Several reasons were given for slow payments including: (i) erratic supplies as residents at the end of the lines or at higher elevations often did not get water for 2 1/2 weeks at a time; and (ii) rationing of supplies because of low pressure.

The lack of community involvement and participation (as they were not even held responsible for maintenance) contributed to the negative project results.

8. Kenya (Bondeni)

Bondeni is located in the Central Province, Nyeri District, and had a population of 5,000 families. The main source of income was from dairy production and potatoes. The traditional source of water was the river at 2 km distance from the furthest villagers. The river flowed all year round and the water quality was good.

The people came together and discussed a perceived water problem. In 1975, a Harambee committee was formed, seven women, four men, and money was collected to act on their plans. Design was done by the MWD and the committee. The people knew the scope of the project before construction started later the same year. The villagers contributed labor for trenching, pipelaying, and construction of storage tanks and the pumphouse. The system used an engine driven centrifugal pump drawing water from the river to supply household needs through communal water points, and individual connections. Eventually the total community were to be served through individual connections. Each individual had to pay for the materials needed to deliver water from the main line to his plot had to supply the necessary labor.

Water was available 24 hours a day. The committee had a salaried pump attendant who also handled maintenance. There was no stock of spare parts. When repair was required, the District MWD office supplied parts and the required expertise. Recurrent water charges amounted to 20 KShs per individual connections.

People from the MOH visited the villages once a week educated them on health, thus constantly reinforcing the link between safe water and health.



9. Kenya (Taitu)

Taitu is also located in Kenya's Eastern Province, with a population of 8,000 - 10,000. Traditional water source was a river which also provided supplies for the improved system. The river was reliable and had good quality water in the dry season (August and September and February to mid-March). During rainy season the water became muddy.

The Taitu Water Project began prior to 1970 with the support of the Ministry of Health. A Harambee committee was established and money collected. The community members did the construction of the system with some assistance from the District Development Committee. A 50,000 gallon storage tank was built which provided intermittent supplies to about 400 families. Villagers often lacked money for fuel and to hire a pump operator. There was no set fee for water; money was collected to buy fuel and any surplus was used to hire one person to patrol the lines. Spare pipes or parts were not stockpiled.

In 1975, a Water Association was formed to build an improved system - a gravity system using a furrow as the main line. The Ministry of Water Development provided technical assistance in surveying and checking the plans for the weir intake. Once construction was finished water flowed to the individual homes from the furrow. The furrow was cleaned and maintained by the association members who were charged annual fees for maintenance.

Maintenance costs were high, particularly for labor since once a year during the rainy season high stream flows washed rocks and mud into the intake; this task took several hours to clean. But maintenance was generally done promptly by voluntary village labor which helped to keep the cash requirements low.

No major problems were encountered with the system during an ex/post evaluation several years later.

10. Mali (Kita, Bafoulabe and Kenieba)

This World Bank-assisted project was designed to serve approximately 240 villages with 340 productive boreholes and installing an equal number of handpumps.

Prior to the start of operations, DNHE entered into an agreement with each village outlining its responsibilities related to the construction and O&M of the water point to stimulate interest and participation in the project. This dialogue was facilitated by a relatively good village organization: each village council was headed by a chief who was, among other things, responsible for the village cash boxes, containing tax collections, the proceeds of communal agricultural activities, profits from cooperatives, etc. The villages were required to pay US\$360 (1982 price levels) to the project account which represented about one-third of the purchase price of the pump and a fraction of the cost of cement necessary for site preparation. Total village cash contribution to construction costs represented about 2 percent of an average village's expenses.

In addition villages were required to pay US\$80 annually for regular pump maintenance which would cover purchase of spare parts and the costs of repair interventions done by the DNHE field team. This amount represented less than one percent of the estimated expense levels in an average village in 1982. Replacement costs were also to be met by the villagers once the suppliers' guarantee had expired.

A nucleus field team of DNHE was established at the regional level within the framework of the decentralization policies of the Government for the RWS subsector to provide technical backstopping for maintenance.

DNHE's role consisted of stockpiling and pricing of spare parts; training of village caretakers; and ensuring the availability of its own mobile maintenance team to oversee village and sub-district level repair activities and to intervene in cases where repair problems exceed the skills of the village. DNHE's role was expected to decrease in later years as villagers' dependency on outside support gradually decreased.

11. Nepal (Newal Parasi)

This integrated rural development project evolved from medical work which the United Mission to Nepal (UMN) began in 1970. The project installed about 42 drinking water systems serving 68 villages of the Nawal Parasi hills, total population of 11,000.

Three different to project implementation approaches were used since the scheme began which had a direct bearing on the level of participation and cost sharing by the beneficiary community. These ranged from a top-down approach with no community participation to an open participatory approach in which communities became involved in the preparation, construction, and operations and maintenance of their own drinking water system.

The first water system built for a number of villages was designed and implemented by the government. Villagers' investment was minimal. When maintenance problems arose the water users did not respond, perhaps out of ignorance about the technology. They also perceived that the operations and maintenance function belonged to the government since they were not guided and trained in the operation of the system. Due to lack of maintenance, these systems became low yielding and many were non-productive during the dry season.

Once the project approach was changed to involve community participation in design and implementation decisions, community attitudes changed dramatically. Design decisions were made in collaboration with the villagers. Communities even managed construction of their systems by organizing and supervising volunteer labor. By completion of the project villagers were responding voluntarily to operations and maintenance needs aided by engineers foreign or local who lived in the area for a short period to train and involve the villagers with all aspects of their new technology.

12. Kenya (Aguthi)

This project covered a 100 km area in the Central Province with a population of 52,000 and comprised a surface water based, gravity-fed scheme with 10 km of transmission mains, a treatment plant, and 100 km of distribution mains.

The first phase of the project was delayed for nearly 1 1/2 years, partly because of disagreements on cost recovery issues. The Kenyan-Danish project agreement specifically required water consumption to be metered and billed according to meter readings. However, in 1981 the Kenyan Water Ministry decided to implement a program of general flat rates nationwide. DANIDA insisted on the metering in order to recover cost and to prevent wastage. Project start-up was consequently suspended for several months. Finally, a compromise was agreed whereby flat rates were billed based on a specified maximum bulk consumption, consumption in excess of this which incurred additional charges.

The lack of coordination between central and local water authorities further delayed project operations. Local authorities wanted to use the Harambee approach whereby villagers provided part of the funding and volunteer labor for the excavation for pipes, which was already successful in several villages. (The local residents considered these schemes to be "their own" and consequently felt strongly committed to maintaining them). Because central authorities were not informed about these schemes previously and they were only encountered during construction of Phase I of the project long delays ensued as approaches were modified in a very bureaucratic manner.

The implementation of Phase II also got delayed, because of lack of interagency coordination and because of lack of manpower and budget provisions for operations and maintenance. An understanding was eventually reached, according to which DANIDA would collaborate directly with the local water authorities and which would also ensure that the beneficiaries would become more strongly involved in the project by providing volunteer labor, etc.

13. Tanzania (Shinyanga)

The Shinyanga shallow wells project, a joint project between Tanzania and the Netherlands, started in 1974. Its objectives were to:

- o form a construction unit to build 700 shallow wells in two years;
- o guide the construction program during a nine month start-up period and for two years of construction; and
- o train counterpart personnel to ensure continuation of the project.

Shallow wells are common in the Shinyanga region, and throughout Tanzania. All were open wells where the user got water with a rope and bucket. The new project provided sealed wells with handpumps.

The project faced a number of delays from the start. Some of them resulted from lack of support from the government while others resulted from poor implementation plans or from an expansion of the scope of work.

The Government failed to provide the promised number of qualified counterparts for technical assistance nor did it facilitate the acquisition of basic materials such as cement. Finally, the first wells could not be completed because the pumps that were to be supplied by the government were not provided. As a result, the project manufactured pumps adapted from another (Ugandan) design.

The project was intended to provide the technical assistance and materials to build the system, but to depend on local labor contributions in the actual construction. This plan did not actualize since people did not volunteer. Some of the reasons cited were: because of Government policy, people expected water as a free service; villages were either newly formed or newly expanded (under the Government program to relocate everyone in villages); and individuals were required to expend all their energies on new homes and schools; and finally, a system with handpumps was not considered modern.

14. Tanzania (Singida)

The Singida windmill/diesel project was a joint project between Tanzania and Australia which started in 1975. The purpose of the project was to provide water for people and livestock using supplied from deep wells and pumped primarily by windmills. Wind velocity was sufficient to power the windmills for an average of nine months annually, corresponding to the dry months of the year. A diesel engine provided back-up support when the winds were insufficient.

The windmills were considered desirable because of their tested reliability, and low maintenance needs. The useful life of a windmill in Australia was up to 80 years. The only routine maintenance was a semiannual inspection and an oil change every five years. Training was also included in the project.

There were several problems with the project which led to its failure drilling rigs were unsuitable; spare parts and basic materials difficult to obtain; Government counterparts were not provided; and windmill towers were vandalized.

The Governments of Tanzania and Australia were unable to agree on standards and supplies. The government had a large surplus and insisted on using them for all substantial drilling projects. The Australians considered them a poor choice for conditions encountered in Singida.

As a result of the lack of agreement between the Government and donor agency, the project had problems getting a sufficiently uniform supply of pumps for the diesel-driven wells and spare parts. Finally, the project staff decided to import Australian pumps and spare parts.

Other basic supplies were sometimes difficult to get, including cement, which slowed the progress of the project. The project also suffered long periods of inactivity as there were no fuel to operate the vehicles or drilling rigs. Moreover, the costs of the project escalated as increasing measures had to be taken against vandalism.

Eventually sunk costs were incurred as the Australian model had to be abandoned and replaced with a program to build shallow wells on the previously executed Shinyanga model.

15. Kenya (Kibirichia)

Kibirichia is located in Kenya's Eastern Province, and had a population of about 17,000 persons at the time of project initiation. Two furrows built by an European farmer long ago provided the traditional source of water. There was no other source of water in the area and most people lived 2 to 3 miles from the furrows.

In 1964, a committee was established to extend piped water from one of the existing furrows. <sup>1/</sup> Money was collected from the association membership. The Ministry of Health and UNICEF were contacted and some materials were supplied to build three storage tanks. Technical assistance was provided by the MOH, but the association members did all the trenching and pipelaying themselves in 1964.

Intermittent water shortages led to water rationing so that water was supplied to each section one week at a time.

In 1971, the committee decided to upgrade the system. They collected 200 KShs per family from those using the water and bought 1,000 3-inch diameter pipes. Lack of adequate funds caused the project to halt temporarily; the community then decided to merge with another sub-location to help increase the volume of funds. Each sub-location contributed 40,000 KShs which was matched with 40,000 KShs from the Kenya Government (total 120,000 KShs).

The community was then able to bring water from a more distant river via a new furrow and one of the original furrows which provided good quality water with no sediment load.

16. Tanzania (Iringa, Mbeya and Kuyuma)

This rural water supply project covered three vast regions with a population of about 2.5 million. An important part of the project were socio-economic studies, carried out, inter alia, to determine how the beneficiaries could be actively involved in planning construction and maintenance of the

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<sup>1/</sup> The village had a history of cooperative activity and there were many cooperatives in the village for collecting and selling farm produce. Everyone belonged to some type of cooperative.

schemes. Based on the studies' recommendations, criteria were established for village selection:

- \* The village must establish a water committee, consisting of three village council members and three representatives of women in the village. The committee must participate in the detailed planning of the scheme, including decisions regarding location of wells and faucets;
- \* The population must carry out part of the construction work, including excavations for shallow wells and for pipe trenches;
- \* Before any construction work began, an agreement must be made between the village and local water authorities regarding the future operations and maintenance of the water supply scheme. One male and one female resident must be trained to monitor the operation of the scheme and to carry out simple repair work such as leak repair, repair of broken faucets, etc. Further, the village must assume the economic responsibility for operations and maintenance. (Under certain circumstances, assistance in financing operations and maintenance may be granted during an initial period).

One example may illustrate the problems at the village level to comply with these conditions. The village of Ngwala in the Mbeya region got a water supply scheme for its 200 families during the first phase of the project in 1982. The scheme was a gravity scheme, fed by a mountain spring. The village committed itself to participating in construction work and operations and maintenance.

The operations and maintenance costs for this very simple scheme were estimated at about 20 shillings per person per year. Even this small amount (20,000 shillings annually for the whole village) presented a major problem for the village council which had a total 1981 budget of only 24,000 shillings -- which were used mostly for seeds, fertilizer, etc. In principle, raising the village income through increased agricultural production should not be a problem for Ngwala which is located on very fertile soils with large uncultivated areas. However, the village was unable to afford to transport its cotton, bananas and other produce to outside markets and remained totally dependent upon the State Company that purchased these products. (In 1982, the village produced cotton worth 64,000 shillings, but the truck from the State Company never showed up, and the cotton was left to rot during the rainy season).

This example represents the experience of many villages and reflects Tanzania's political and economic environment. Because prices paid to the farmers generally are so low that there is no real incentive to produce in excess of what is needed for the subsistence of the family, the concept of cost recovery for development projects, such as water supply schemes, remains severely hampered.

17. Zimbabwe

Every opportunity was taken to inform the beneficiary population about the project. Over a period of about six months meetings were held with various community leaders to plan a suitable, acceptable program. Many factors were taken into consideration in this planning including the seasonal availability of local labor, the location of open wells, the types of pumps to be used, and degree of involvement and contribution of the villagers. In addition a District Health Education Program was mounted in preparation for the project to educate villagers about the benefits of clean water and stimulate their willingness to participate.

As the majority of the people in the district were subsistence farmers it was decided that the initial capital contributions would be solely in the form of foreign grants. The villagers participated in construction (digging the wells, lining them, and where possible, collecting pumps and transporting material) which helped to keep costs to a minimum.

The Blair pump was selected for the area because of its suitability for shallow well operation, its durability and low cost. Assembly of the pump was done by local trainees at a Mission workshop. This workshop was also responsible for constructing cement slabs, and repairing pumps brought in by villagers.

There was an estimated four protected wells in the area before the start of the project. In three years this number rose to 302 Blair Handpumps and four boreholes installed in the District.

While the rate of construction was impressive an ex post evaluation revealed a high breakdown rate brought about largely by the failure to adequately make provision for the recurrent operation and maintenance needs of the project. The report attributed this outcome to the project's failure to: (i) institute short courses on village level pumps' maintenance; (ii) organize specific water committees to supervise proper use of the protected wells and also to repair the pumps promptly; and (iii) encourage the community to save money for buying spare parts and for buying replacement pumps.

18. Sudan (Kadugli)

The UNICEF-supported Kadugli Water Supply and Sanitation Project in South Kordofan Province aimed at constructing 900 wells fitted with handpumps by the end of 1985. At the time of evaluation in 1982 (some six years after project start) only 102 wells were completed. One of the factors leading to slow progress was the lack of financing for spare parts because no attention was paid to setting up a decentralized system to recover costs for maintaining wells and handpumps.

Operation and maintenance were carried out by members of the project construction team, but they performed poorly because of a shortage of equipment and spare parts. Moreover maintenance records were not kept which did not allow for calculation of the maintenance costs accrued. An improved

maintenance system was subsequently proposed aimed at: (i) decentralizing handpump maintenance by utilizing existing service centers in the four districts; training of the personnel at the service centers; (ii) appointing and training village handpump caretakers for each village to do basic maintenance; and (iii) decreasing reliance on service centers by instructing villagers in the systematic disassembly of the pumps and giving them the necessary tools required for the job.

19. Sudan (Wau)

This was a major groundwater project in the Southern Region of Sudan also supported by UNICEF. The project began in 1976 targetted to construct 2,500 wells fitted with handpumps by the end of 1985. In 1982 (some 6 years later) when the project was evaluated less than 20 percent of the work was done (only 416 wells completed). Of a scheduled rate of 250 per year, only 69 were constructed each year. The lack of attention to financing arrangements for operation and maintenance was considered a major delay factor.

Attempts to set up a maintenance team led to the hiring of centralized mobile teams, each one comprised of a foreman, four crew members and a driver. This approach failed because of the high costs associated with transport. Future maintenance than relied on provincial teams reporting to the Commissioner for rural water development of each province. The province head office out major repair work. Districts, councils, and chieftains carried out minor maintenance work while the local rural water department staff supplied spare parts and trained maintenance workers.



## INDICATORS OF COST RECOVERY PERFORMANCE

Project by Country	Cost Recovery Goals <sup>1/</sup>	Cost Rec. % <sup>2/</sup>	Compliance with Covenants	Net Internal Cash Gen. Compared with Forecast <sup>3/</sup>	URMS		Comments
					Before	After <sup>4/</sup>	
Ghana Ln. 1320	To generate revenues to meet operating expenses and debt service	83	Compliance with the rate of return covenant was poor.	lower	48	44	Actual revenues were much lower than projected at appraisal because of shortfalls in production and higher-than-expected unaccounted-for-water. Instead of generating an operating surplus during 1977-82 as anticipated at appraisal, WSC posted a cumulative loss of US\$6.5 million. The number of employees per 1,000 connection was relatively high in WSC (13.7)
Bangladesh Cr. 367	Recover costs to cover operating expenses, including taxes, interest, and depreciation and to contribute to expansion	45	WASA failed to meet its revenue covenant because of failure to increase tariffs.	unsatisfactory	53	47	WASA failed to comply with covenanted tariff increases and incurred operating deficits each year of the project period. Water sales accounted for only about 50% of production each year; there were no satisfactory arrangements for leak detection, waste prevention or reduction of illegal connections. Collections were a mere fraction of billings. There were serious staffing constraints among senior finance and revenue staff and overstaffing at the lower levels.
Bangladesh Cr. 368	Recover costs to cover operating expenses, including taxes, interest, and depreciation and to contribute to expansion.	77	WASA failed to meet its revenue covenant because of failure to increase tariffs.	unsatisfactory	-approx. 90%		WASA failed to maintain tariffs at levels sufficient to finance operational expenditures as covenanted. Water sales were only 43% of production each year; no satisfactory programs for recovering standpipes costs, leak detections, illegal connections or for waste prevention. Tariff levels were inadequate; billing and collection was inadequate. Metering was not comprehensive and meters were defective resulting in excessive water consumption.
Botswana Cr. 233	Revenues should be adequate to cover operating expenses, depreciation and interest.	91	Rate of return covenant met.	MUC's internal cash generation was not expected to finance capital expenditures during or shortly after the project was completed.	-- low -- approx. 25%		MUC's cost recovery performance was very satisfactory. Sales of water were sufficient to cover operating costs (excluding interest charges). Tariffs were established, revised and collected with the proficiency of a well run private entity.
Brazil Ln. 1009	To recover sufficient funds to cover operating costs, debt service, capital increases, part of fixed assets expansion.	104	Revenue covenant was not met because of COPASA's inability to increase revenues to offset high operating and administrative costs. Account's receivable covenant not met.	lower	34	30	Cost recovery was unsatisfactory through 1979 but improved in 1980-81. Its accounts receivable also deteriorated during the project period. COPASA became, by the end of the project, a well managed, adequately staffed and technically competent utility. Reduction in water losses was due to success in its meter repair and metering programs.
Colombia Ln. 1320	To generate revenues to meet operating expenses and debt service.	53	Rate of return covenant not met.	lower	30	38	EMCALI's poor cost recovery performance was attributed to political pressures which resulted in overstaffing, inadequate tariffs and high unaccounted for water. Revenues remained above appraisal estimates but were not high enough to offset increases in low-income neighborhoods; lower than expected number of new connections in Cali contributed to most of the unaccounted for water.
Colombia Ln. 1523	Revenues from valorization charges and tariffs should cover O&M costs plus meet specified rates of return targets		Not in compliance. Rates of return are negative	---	23	41	U-F-W mainly due to illegal connections remained high at 41%. Sales volume and connection rates were low.
Ecuador Ln. 1030	Revenues from water sales should cover all operating costs	53	Rate of return covenant not met.	---	25	50	Poor financial results were caused by (i) very high operating costs due to a growing wage bill and system losses caused by unaccounted for water exceeding __\$, (ii) over investment caused by inaccurate market demand; and (iii) meter repair and maintenance problems.
Ethiopia Ln. 310	N.A.	98	Rate of return ratio lower than covenanted.	much lower	35	45	AWSA's performance could have been better (even under the adverse political and social upheavals prevailing then) if their accounting system functioned well. Instead, the entity's collections lagged considerably; account's receivable rose to 35% of sales' revenues by close of project. Water production almost doubled during the life of the project, but practically two-thirds of the extra water produced was lost through leakage, illegal connections and faulty metering.

## INDICATORS OF COST RECOVERY PERFORMANCE

Project by Country	Cost Recovery Goals <sup>1</sup>	Cost Rec. % <sup>2</sup>	Compliance with Covenants	Net Internal Cash Gen. Compared with Forecast <sup>3</sup>	UFRS Before After <sup>4</sup>	Comments
India Cr. 585	Costs were to be recovered to finance recurrent operations, expansion and provide cross subsidies for poorer and less viable systems.	N.A.	--	--	--	Poor cost recovery achievements were due to a lack of institutional appreciation and support for the importance of O&M and its relation to costs.
Jamaica Ln. 1146	Revenues were expected to cover operating costs and generate a surplus.	84	Negative rate of return which progressively worsened.	lower	16 31	Cost recovery was limited by (i) low sales volume (ii) slow connections (iii) delays in tariff approval and (iv) weak collection effort.
Liberia Cr. 859	N.A.	74 <sup>1/2</sup>	All cost recovery related covenants were not met. These include requirements to (i) increase tariffs to produce a targeted rate of return on fixed assets; (ii) prepare a tariff study; (iii) improve billings and collections.	unsatisfactory	90 50	LUSC's unsatisfactory cost recovery performance was the result of (a) the failure to increase tariffs; (b) inadequate billing system; (c) consistent high levels of unaccounted-for water; (d) high accounts receivable (15 months' gross billings)--Government departments were particularly delinquent.
Malaysia Ln. 908	N.A.	113	Revenue covenant was met.	satisfactory	22 22	Actual operating surpluses were achieved because of larger volumes of water sold and rate increases despite its weak financial/administrative performance; irregular preparation of financial statements; lack of clarity in the use of funds; high level of accounts receivable; low tariffs; delays in billing and collection. WD suffered shortages of qualified staff which contributed to these difficulties.
Mexico Ln. 1520	To generate revenues to provide CAVM with annual net internal resources equal to an annual percentage of capital expenditures.	N.A.	Cash generation covenant met.	lower	N.A.	Poor cost recovery caused by shortfall in bulk sales, and the lack of satisfactory action on bulk purchase agreements and payments to CAVM by the bulk purchasers. CAVM was not empowered to unilaterally set bulk water tariffs and to enforce collection of its bills. Accounts receivable also increased from 2 months of billing in 1974 to 16 months of billings by 1980.
Pakistan Cr. 450	To turn around the Agency's financial portfolio to health and viability.	95	Revenue and rate of return covenants met.	--	--	Clear goals and implementation of a strategic action plan helped Pakistan attain good financial results.
Panama Ln. 1520	To generate revenues to cover debt service requirements, working capital and contribution to investment.	104	Compliance with revenue covenant was slightly below expectation.	higher	35 20	Factors contributing to good cost recovery performance included: better records of sales as a result of computerization; higher rate of connections than forecast at appraisal; improvement in collection of overdue accounts resulted in higher internally generated funds available for capital expenditures.
Singapore Ln. 918	To generate revenues to (i) cover operating costs including depreciation; and (ii) debt service to the extent it exceeded the provision for depreciation.	146	Cash generation covenant was met and exceeded appraisal target.	higher	N.A. N.A.	Timely tariff increases were sufficient to compensate for steady rising costs. The entity produced a net surplus of US\$39.1 million during the project period 1973-76. Overall financial results of the entity are good and quite close to appraisal forecasts.
Somalia Cr. 822	Establish and maintain tariff levels adequate to cover cash operating expense and depreciation or debt service, whichever is higher.	N.A.	N.A.	--	--	Failure to follow policy advice on operational efficiency enhancement measures led to little improvement in cost recovery rates.
Sri Lanka Cr. 709	The sector was to gradually become self-financing through a system of progressive charges. Tariff yields were to cover operating expenses and debt service plus finance expansion.	62	N.A.	--	--	Cost recovery was hampered by (i) failure to revise tariffs regularly, (ii) ineffective billing and collection. A Financial Recovery Program begun in 1983 started yielding positive results by 1985.
Syria Ln. 1498	To become self financing and contribute to expansion.	48 77 <sup>6</sup>	N.A.	Much lower than expected.	26 38	The tariff remained unchanged; consumption was excessive; accounts receivable stood at 10 months; UFRS remained high; these factors mitigate against acceptable cost recovery rates.
Tunisia Cr. 209	N.A.	106	Covenants were complied with including (i) tariff increases; (ii) payments of arrears by public authorities.	satisfactory	32 33	Success with cost recovery was due to the government's willingness to implement tariff increases which covered operating expenses; SONEDE's continued attempts to reduce water losses through leak detection and repair programs. SONEDE became an efficient well managed institution. It maintained a corps of well trained staff at the professional, foreman and workers levels. The number of employees per 1,000 connections decreased continuously from 16.9 to 10.9 by the end of the project.

## INDICATORS OF COST RECOVERY PERFORMANCE

Project by Country	Cost Recovery Goals	Cost Rec. %	Compliance with Covenants	Net Internal Cash Gen. Compared with Forecast	LFR%		Comments
					Before	After	
Yugoslavia 088	To establish tariffs and connection charges to achieve an agreed rate of return	95	Rate of return covenant complied with	N.A.	--	--	Predetermined subsidies helped to encourage low income connections; the public authorities well run and pursued sound financial and management policies.
Yugoslavia 344	To generate revenue to produce an agreed rate of return.	89	Rate of return covenant not met.	N.A.	--	--	Low water sales; lumpy tariff increases and very high operating expenses were internal factors which led to low cost recovery. The factors of high inflation, unstable political and economic problems weakened the agency's ability to improve cost recovery performance.
Yugoslavia 464 & 559	To establish tariffs to cover all expenditures and generate cash surpluses for future investments.	92	N.A.	N.A.	--	--	High operating expenses; low sales volume; delinquent payments from government agencies mitigated against good cost recovery.
Yugoslavia 1066	Recover costs to cover all operating and administrative expenses, including depreciation, and taxes	112	Revenue covenant was met. Accounts receivable covenant was met.	satisfactory	36	32	The Vodovod Dubrovnik was a well run organization. Accounting and financial management was strengthened early in the project implementation. Tariff increases were done systematically and were sufficient to meet the entity's financial objectives.

- 1 Though cost recovery goals were not made explicit in some Project Completion Reports at a minimum water authorities are concerned with financial viability in terms of cash flows.
  - 2 Cost recovery ratio defined as the ratio of revenues (water sales and connection charges) to operating expenses including depreciation and interest charges. Less than 100% cost recovery would imply insufficient revenues to meet operating expenses. Over 100% would imply net income surpluses which could be applied to financing systems expansions.
  - 3 Compare actual levels of self-financing of investments with forecasts made at project appraisal.
  - 4 These percentages are only illustrative. Many sector agencies lack precise measurement techniques including accurate production measurement, reliable records, reliable consumption measurements. The use of fixed rate charges, the lack of standard accounting system, free water usage by some governments further obscures precise estimation.
  - 5 Revenues based on billings only.
- 6 *Average for the four year period 1979-1982.*  
Data derived from Project Completion Reports.

Notes

1. This Annex provides an illustration of the cost recovery experience of a limited number of water authorities. The data suggest that cost recovery ratios per se based on financial statements are not reliable indicators of the effectiveness and efficiency of water supply operations. A cost recovery ratio of say 98 percent using the narrowly defined financial ratio may grossly overstate the financial capacity of the authority to recover what should be its real costs. Depreciation costs may not reflect the true rate at which the capital assets of the utility are being consumed because of lack of maintenance. A few utilities whose financial statements show revenues exceeding costs operate with 40 to 50 percent of unaccounted for water and are not well run. They may be underspending on maintenance and overcharging for the quality of services provided. Nonetheless, there appears to be direct relationship between true 'full' cost recovery and institutional efficiency.
2. The selection of cases was not based on a representative sample of projects but was guided by the availability of project implementation and completion data.

Characteristics of Cost Recovery for Rural Water Supply

Project/Country	Water System/Technology	Cost Recovery Instrument	Responsibility for Collection	Comments
Thailand	Piped House Connections	Volumetric Tariffs	Local public enterprise	Water rates were higher than in Bangkok but were acceptable and affordable to the rural users. Communities even developed innovative financial strategies including credit & water sharing schemes.
Kenya, Kericho	Pumps	Flat rate of approx US\$3 per family/year	Water Committees	Community participation (cash, labor, material, leadership) was high during project design & implementation.
Kenya, Western Province	Handpumps	Flat Rates	Well Committees	Active community participation was sought to gain commitment to pay for O&M.
Malawi, South	Handpumps	Flat Rates	Community Groups	Community groups were informed and organized early in project cycle. User paid for O&M plus part of capital costs.
China	Piped Water	Tariff based on metered & unmetered measurement	Village water works offices and/or village agricultural Organizations	Users paid full costs of O&M plus depreciation in addition to paying the greater portion of the capital costs. Users were fully involved in selection of technology and cost determination.
Yemen, Al Boun	Motorized Pumps	Flat Rates	Village Cooperations	Active mobilization of village labor and support resulted in villages contributing to over two-thirds of the capital costs plus total village responsibility for O&M.
Kenya, Tatu Thengenge	Household Piped Connections (gravity)	Flat Rate of 15 Shillings per family/month	Local Government Authorities	Payments were erratic and O&M costs were not recovered. Communities were not encouraged to take part in the development of the system. They were not even mobilized for O&M.
Kenya, Bondeni	Piped House Connections (Diesel Pump)	Flat Rates of 20 shillings/family/month	Herembee Committee	The Govt. working with Herembee committee designed and implemented the system. Active participation was sought from users, including in kind payments for connection.
Kenya, Taitu	Piped House Connections (gravity)	Flat Annual Fees	Herembee Committee	Design and construction done by village associations with technical inputs from Govt.
Malawi, Kite	Handpumps	Flat Rate of \$20 per village/year for O&M	Village Council	Each village paid US\$60 (the equivalent of 1/3 the price of the pump plus a fraction of construction inputs). Total village financial responsibility amounted to no more than 5 percent of village annual income.
Kenya, Aguthi	Piped House Connections (gravity)	Lifeline rates plus progressive charges above lifeline.	Local Authorities	Donor and host were slow to reach agreement on policy and approaches which slowed project startup.
Tanzania, Singida	Pumps (diesel/windmill)	N.A.	N.A.	Donor and host were slow to reach agreement on policy and approaches which slowed project startup. Community support was low.
Kenya, Kibirichie	Piped Water Connections	Flat Rates	Water Association	Community initiative and participation were important factors in development of this project.
Sudan, Kadugli	Handpumps	-	-	No arrangement made for cost recovery.
Sudan, Mau	Handpumps	-	-	No arrangement made for cost recovery.

Rural Water Supply Systems

Cost Recovery Implications of Alternative Financing Options

<u>Financing Options</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Comments</u>
Government budgetary allocations	<ul style="list-style-type: none"> <li>o Implicit acceptance to allocate maintenance resources</li> </ul>	<ul style="list-style-type: none"> <li>o Unpredictable - because funds are usually determined by governments based on national priorities and competing needs of other sectors, allocations for rural water are unreliable</li> </ul>	
Foreign loans and grants	<ul style="list-style-type: none"> <li>o Enable governments to finance capital investments they might not otherwise be able to finance.</li> </ul>	<ul style="list-style-type: none"> <li>o Procurement is often tied to bilateral countries.</li> <li>o No provision is made for maintenance and schemes become defunct shortly after installation.</li> <li>o Donor funds are limited and cannot be relied on for this purpose.</li> </ul>	<ul style="list-style-type: none"> <li>o Past experience has influenced donors to provide for O&amp;M needs in project design.</li> </ul>
Private Sector	<ul style="list-style-type: none"> <li>o Most likely to ensure maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>o Cost of capital may be beyond users' affordability.</li> </ul>	<ul style="list-style-type: none"> <li>o Remains untapped largely because agencies responsible for rural water supply are not acceptable as borrowers.</li> </ul>
Cross subsidization	<ul style="list-style-type: none"> <li>o Ensures that the poor gain access through public standposts, while those who can afford, pay a progressive tariff for individual connections.</li> </ul>	<ul style="list-style-type: none"> <li>o Resistance of urban consumers</li> </ul>	<ul style="list-style-type: none"> <li>o Many urban systems, particularly those where migration has increased the number of urban poor, would be overextended and the already erratic service would be worsened.</li> </ul>
Village Contributions	<ul style="list-style-type: none"> <li>o Ensure that decision to make capital contribution and eventual contribution to O&amp;M is carefully considered.</li> <li>o Increase villagers' sense of responsibility for the system and so encourage good maintenance and careful use of facilities</li> <li>o Establish the principle of payment for services received.</li> </ul>	<ul style="list-style-type: none"> <li>o While labor contributions are acceptable alternatives to cash contributions the seasonal fluctuations of labor (being dependent on the agricultural cycle) may curtail project implementation.</li> <li>o Equity - the relationship between per capita costs of installing and operating a system and per capita income will vary from village to village and by country. The unit costs may be highest in the villages least able to afford them.</li> <li>o Since systems cost vary depending on the source of water and distribution technique (gravity fed systems with handpumps being the cheapest), more villages will qualify in areas where the least expensive solution is appropriate, even though the need in these areas may be less.</li> </ul>	<ul style="list-style-type: none"> <li>o Because many villages operate in a non-cash economy it remains difficult to determine villager's capacity to pay capital costs.</li> </ul>

## REFERENCES

### Urban Water Supply

1. Bahamas, Loan 1320-BM, Water Supply and Sewerage Project for New Island. Project Completion Report (PCR), June 15, 1983.
2. Benefit Estimation in Water Projects. Draft Paper. Water and Urban Development Department, December 1984.
3. Colombia, Loan 1523-CO, Second Cali Water Supply and Sewerage Project. PCR, May 8, 1984.
4. Colombia, Water Supply and Wastes Sector Study: Finances, Institutions, Planning and Training. LAC Regional Projects Department. February 14, 1986.
5. Ecuador, Loan 1030-EC. Guayaquil and Guayas Province Water Supply Project. PCR, June 11, 1985.
6. Garn, H. A., Investment Issues in the Water Supply Sector. Draft Paper. Water and Urban Development Department, August 1985.
7. Garn, H. A., Review of Completed Water Projects. Draft Paper. Water and Urban Development Department, October 1985.
8. India, Credit 585-IN, Uttar Pradesh Water Supply and Sewerage Project. PCR, December 17, 1985.
9. Indonesia Water Supply and Sanitation Sector Profile, Asian Development Bank, December 1984.
10. Investment in the Water Supply Sector--A Framework for Policy and Project Choices. Water and Urban Development Department. May 1985.
11. Jamaica, Loan 1146-JM, Kingston Sewerage I and Water Supply Project. PCR, June 19, 1985.
12. Pakistan, Credit 630-PAK, Second Lahore Water Supply, Sewerage and Drainage Project. PCR, July 1985.
13. Panama, Loan 1280-PAN, Water Supply and Sewerage Project. PCR, May 17, 1983.
14. Report on Asia Regional External Support Consultation. In connection with the International Drinking Water Supply and Sanitation Decade, Manila, 21-25, October 1985. Manila/Geneva, November 1985.

15. Roth, Gabriel. "The Role of the Private Sector in Providing Water in Developing Countries." EDI. The World Bank
16. Sector Report. Water Supply and Sewerage Projects Financed by the World Bank in India. Financial and Institutional Performance. South Asia Projects Department. The World Bank, January 1986.
17. Somalia, Credit 822-50, Mogadishu Water Supply Project. PCR, July 12, 1985.
18. Sri Lanka, Credit 709-CE, First Sri Lanka Water Supply Project. PCR, July 19, 1985.
19. Syria, Loan 1458-SYR, Aleppo Water Supply Project. PCR, November 22, 1985.
20. Tunisia, Loan 1088-TUN, First Urban Sewerage Project. PCR, January 4, 1984.
21. Turkey, Loan 844-TU, Istanbul Water Supply Project. PCR, January 4, 1984.
22. Yemen Arab Republic Credits 464-YAR and 559-YAR, Sana'a Water Supply Project and Hodeida Water Supply and Sewerage Project. PPAR, January 18, 1985.
23. Yugoslavia Loan 1066-YU, Dubrovnik Water Supply and Wastewater Project. PCR, November 28, 1983.

Rural Water Supply

24. A.I.D. Policy Paper, Recurrent Costs; Washington, DC, USAID, May 1982.
25. AWWA Seminar on Small Water System Problems Sponsored by AWWA, St. Louis, Missouri, June 1981.
26. Ballance, R. C. and Gunn, R. A., "Drinking-water and Sanitation Projects: Criteria for Resource Allocation." WHO Chronicle, Volume 38, No. 6, 1984.
27. Biswas, Asit K. (ed.). Water Development and Management. Proceedings of the United Nations Water Conference. Volumes I, II, III, IV. Mar del Plata, Argentina, March 1977.
28. de Ferranti, David. "Paying for Health Services in Developing Countries: A Call for Realism." World Health Forum. Volume 6, No. 2, 1985.

30. Falkenmark, Malin (ed.). Rural Water Supply and Health: The Need for a New Strategy. Sweden: Scandinavian Institute of African Studies, 1982.
31. Glennie, Colin. Village Water Supply in the Decade: Lessons from Field Experience. New York: John Wiley & Sons, 1983.
32. Golladay, Fredrick L. Meeting the Needs of the Poor for Water Supply and Waste Disposal. World Bank Technical Paper No. 9, 1983.
33. Kenya: Rural Water Supply Development Project in Western Province. Report of the Review and Appraisal Mission (Phases I and II), June 1985. FINNIDA and MOWD, Kenya.
34. Kenya: Appraisal Report on Kwale District Village Water Supply and Sanitation Project, March 1985.
34. Kenya: Operations and Maintenance Study. MOWD/SIDA, November 1983.
35. Liim, Tore and Skofteland, Egil (eds.). "Water Master Planning in Developing Countries: Study Case: Water Supply and Sanitation in Tanzania. Seminar at Bolkesjo, Norway, January 17-21, 1983. Oslo: Norwegian National Committee for Hydrology, 1983.
36. Meier, Gerald M. (ed). Pricing Policy for Development Management. EDI Series in Economic Development, Baltimore; Johns Hopkins Univ. Press, 1983.
37. Merabet, Zohra, "How the Yemen is Trying to Meet the Aims of the Water Decade," Waterlines, Vol. 2, No. 4, April 1984.
38. Meeting a Basic Human Need: AID's Rural Potable Water and Sanitation Program. Report to the Administrator, A.I.D., U. S. General Accounting Office. February 1984.
39. Potable Water for Nine Cities in the Interior of the Country, Paraguay, InterAmerican Development Bank, September 1985.
40. Review of Phases I and II of the UNICEF Assisted Rural Community Piped Water Supply Programme, Sri Lanka. UNICEF, June 1980.
41. Roy, Sanjit. A One-Tier System: The Tilonia Approach to Handpump Maintenance. Waterlines. Vol. 2, No. 3, January 1984.
42. Rural Water Projects in Tanzania: Technical, Social and Administrative Issues. A.I.D. Evaluation Special Study No. 3. U. S. Agency for International Development, 1980.



43. Rural Water Supply Development - The Buba Tombali Water Project 1978-1981. The Netherlands: International Reference Centre for Community Water Supply and Sanitation (IRC), 1982.
44. Saunders, Robert J. and Jeremy J. Warford. Village Water Supply: Economics in Policy in the Developing World. Baltimore: The Johns Hopkins University Press, 1976.
45. Strauss, Martin. Community Water Supply and Sanitation Programme of the Western Development Region of Nepal. IRCWD News. No. 18119, December 1983.
46. The Bank's Participation in Rural Water Supply Programs in Latin America and the Caribbean. Inter-American Development Bank, September 1982.
47. The International Drinking Water Supply and Sanitation Decade in South-East Asia. WHO Chronicle, 38 (2); 60-64, 1984.
48. USAID, Community Water Supply in Developing Countries: Lessons from Experience. AID Program Evaluation Report No. 7, September 1982.
49. USAID Policy Document for Cost Recovery, Planning Water Projects. Draft. December 1985.
50. Village Water Supply. A World Bank Paper. March 1976.
51. Water Supply and Sanitation in Rural Development: Proceedings of Conference for Private and Voluntary Organizations. WASH Technical Report No. 14; December 1981.