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FINANCING ISSUES IN THE RURAL WATER SUPPLY SECTOR

Ruperto P. Alonzo

This paper discusses the various issues related to the financing of the rural water supply sector, particularly the rationale behind national government's support for this sector before and after the implementation of the Local Government Code (LGC) of 1991. As in other developing countries, the Philippine government views safe water as a minimum basic need—thus, its continued infusion of subsidy to this sector despite the devolution of responsibilities over water supply to local government units (LGUs). But to get government support, water supply projects must be economically feasible. This paper shows how the national government should determine the extent of support it must give to LGUs in financing the capital cost of water supply. Generally, the higher an LGU's cost of capital, the higher is national government's level of support.

1. The Sector Structure

Water service outside Metro Manila can be one of three levels: a point source system, a communal faucet system, or a waterworks system. A point source (level I) is either a protected well or a developed spring with an outlet but without a distribution system. This is generally suitable for areas with thinly scattered houses. A level I facility normally serves 15-25 households with an outreach of not more than 250 meters from the farthest user. Yield is 40 to 150 liters per minute. A communal faucet or standpost (level II) is a system composed of a source, a reservoir, a piped distribution network, and communal faucets located not more than 25 meters from the farthest house. It delivers an average 40-80 liters of water per capita per day to about 100 households. One faucet is allocated per 4-6 households. This system is suitable for fringe areas where houses are clustered densely to justify a simple pipe system. A waterworks system with individual house connections (level III) is a system with a reservoir, a piped distribution network, and household taps. It is generally suited for densely populated areas.

Based on these categories, the National Economic and Development Authority (NEDA) reports that as of 1992, 42.6 million (66 percent) Filipinos had access to potable water supply. In urban areas outside Metro Manila, 9.97 million people (or 47 percent of households) had access to public faucets (level II) and household connections (level III). In rural areas, 26.6 million people (80

ercent of the population) had access to point sources such as wells or springs evel I). However, only 23.9 million people (72 percent) were actually served ecause 10 percent of the systems were damaged or non-operational. The Cen- r for Research and Communications estimates that in 1992, 30 million per- ons did not have household faucets (level III).

Outside Metro Manila, the provision of piped water to individual house- olds under a waterworks system is found only in the more densely populated ities and towns. The national government assists the formation of water dis- icts in such areas through the Local Water Utilities Administration (LWUA), government-owned corporation. The LWUA sources and provides soft loans nd technical assistance in the formation of these water districts.

The LWUA is a lending institution created in 1973 that forms and assists ater districts in the development and improvement of water supply systems n the countryside. It extends loans to water districts from funds received through apital infusions from the national government and borrowings from foreign anks and international cooperation agencies such as the World Bank, the Asian evelopment Bank (ADB), and DANIDA. Water districts, once they are formed, perate like government-owned and -controlled corporations. They install, op- rate, and maintain water supply and distribution systems for domestic, com- ercial, industrial, municipal, and agricultural use of residents within speci- ied boundaries, usually political boundaries. Some of the water districts also aintain waste water collection, treatment, and disposal facilities within their reas.

As of September 1995, there were 372 active water districts throughout he Philippines. Supply sources for these water districts are mostly groundwa- r. LWUA provides assistance in drilling wells. For any given water district, aw water is sourced from under the ground within or in the periphery of the ocality. The water is channeled to a central collecting tank where raw water is reated by a simple chlorination operation. It is then transported to consumers hrough a system of pipes.

For the less densely populated areas and regions where the setting up of ommercial water districts is not feasible nor financially viable, water sources onsist of wells, springs, and communal faucet systems. (Prior to the twentieth entury, wells and springs were in fact the only source of potable water for the ountry.) These levels I and II systems are operated by Barangay Waterworks nd Sanitation Associations (BWSAs, also called Rural Water Service Associa- ions or RWSAs in some areas). The Department of Public Works and Highways DPWH) assists in the engineering and construction activities for these sys-

tems. Many BWSAs and RWSAs which began as level II systems actually now offer a combination of all three levels of service, including individual house connections.

The National Water Resources Board (NWRB) regulates, coordinates, and formulates medium and long term policies related to the water sector. The NWRB coordinates with various agencies engaged in the utilization of water and regulates its allocation. It also reviews and approves the appropriate water rates that are to be charged by waterworks operators. Waterworks system operators are required to submit to NWRB an annual report of their finances and operations which forms the basis for determining tariff rates. By law, operators of public utilities are allowed a rate of return not exceeding 12 percent.

Regulation of water use is through a water permit system. The present Water Code requires groundwater users to secure permits from NWRB before extracting water from these sources. The exception is users of shallow wells for domestic purposes. However, the reporting of groundwater levels, quality, and pumping rate is rarely done by users.

2. Government Policies on Rural Water Supply

When President Aquino assumed office in 1986, close aides were saying that she would put priority on the rural water supply program, as her campaign visits to the rural areas made her keenly aware of the lack of clean potable water in the countryside. Indeed, as Table 1 shows, the share of the rural sector in water supply and sanitation investments increased from 22.6 percent in 1986 to 47.9 percent in 1987.

In real terms, however, these investments still fell short of the levels in the early 1980s, probably because of the tight financial situation the government faced with its huge debt servicing requirements. Moreover, the magnitude of the problem remained huge, as indicated by the water supply coverage as of the end of 1987 (Table 2).

By the end of 1993, it was estimated that the proportion of the population with access to public potable water supply systems had risen to 68 percent (from the 63 percent level in 1987). For rural areas, the proportion of the population served had risen from 61 percent to 70 percent, while for urban areas within the jurisdiction of LWUA, the increase was from 54 percent to 67 percent. For Metro Manila and its environs which are in the Metropolitan Waterworks and Sewerage System (MWSS) service area, the proportion served even dropped from 86 percent to only 62 percent.

Table 1 - Public Expenditures on Water Supply and Sanitation[1] (in million pesos at constant 1985 prices)

	Total	Metro Manila	Non-Metro Manila	Percent Non-MMA
1981	2469.85	1064.46	1405.40	43.10
1982	2922.92	1186.21	1736.64	40.59
1983	2786.51	1052.69	1733.82	37.78
1984	2001.15	499.46	1501.69	24.96
1985	1737.23	392.01	1345.22	22.57
1986	1139.85	369.45	770.40	32.41
1987	1343.24	643.41	699.84	47.90

[1] The original data report expenditure levels by agency; it is assumed here that only MWSS expenditures are for Metro Manila. The deflator used is the GDP Implicit Price Index.

Source of basic data: *Water Supply, Sewerage and Sanitation Master Plan for the Philippines, 1988-2000.*

Table 2 - Water Supply Coverage as of End-1987 (in millions and percent)

	Metro Manila	Other Urban	Rural	TOTAL
Total Population	8.16	15.37	33.83	57.36
Levels I and II				
Population	0.17	2.70	15.38	18.25
Percent	2.08	17.57	45.46	31.82
Level III				
Population	6.84	5.68	5.40	17.92
Percent	83.82	36.96	15.96	31.24
Unserved				
Population	1.15	6.99	13.05	21.19
Percent	14.09	45.48	38.58	36.94

Source of basic data: *Water Supply, Sewerage and Sanitation Master Plan for the Philippines, 1988-2000.*

While the gains for the areas outside Metro Manila looked impressive, they fell somewhat short of the 1988-1992 target increases in coverage of an additional 30 percent of the rural population and 22 percent of the other urban population.

3. Government and Donor Policies on Financing and Cost Recovery

Before the implementation of the 1991 Local Government Code, the old Water Supply, Sewerage, and Sanitation Sector Master Plan had the following guidelines for the financing of water supply projects:

The capital cost of a level I system would be funded with a 90 percent grant from the national government and a 10 percent equity contribution of the community (through the BWSA and RWSA) in the form of contributions of cash, labor, or land. Operating and maintenance cost would be financed from water charges, while major repairs would be shouldered by the DPWH.

For a level II system, only the cost of water source development would be eligible for a 90 percent grant, with the BWSA and RWSA putting up 10 percent equity. Ninety percent of the capital cost of the distribution system would be financed by a loan, with a 10 percent equity again contributed by the BWSA and RWSA. Monthly charges per household per month should cover all operating and maintenance costs, including debt service at 4 percent per annum over a 20-year term, depreciation of the pump, fuel expenses, and wages and salaries.

The entire capital cost of a level III system would be borne by the water district (WD) or BWSA and RWSA, but only 10 percent equity need be put up by the utility; the other 90 percent would be covered by a loan. The water rates are based on either the Revenue Unit Method or the Quantity Block Method formulated by LWUA. Revenues should cover all costs related to the system's operations. Under the Revenue Unit Method, a minimum charge for the first 10 cu m of consumption per month is assessed based on the diameter of the pipe connection. Consumption in excess of 10 cu.m. per month is imposed a commodity charge derived by multiplying cost per revenue unit by the factor for classification. The Quantity Block Method considers the total cash required to produce the water consumed against the total revenue unit and collection efficiency.

The guidelines discussed above were those established by the defunct Rural Waterworks Development Corporation (RWDC). In practice, however,

lateral and multilateral agencies that fund the water supply projects in the hilippines impose their own conditions on the loan/grant/equity mix and on e water charges.

Thus, the Barangay Water Project of the Department of the Interior and cal Government (DILG), funded by the U.S. Agency for International Devel- ment (USAID), carries a different financing scheme. For level I systems, 100 rcent of the construction cost is given as a grant. Source development for vels II and III systems is similarly covered by a 100 percent grant, as well as rt of the distribution system cost, depending on the beneficiary community's ility to raise equity or amortize a loan. The loan component is arrived at by t assessing the affordability levels of the households (usually from 2 percent 5 percent of their monthly household incomes), then computing how much n the revenues could support, the rest of the cost being given as a grant. The ns carry a 4 percent annual interest rate payable over 20 to 25 years, similar the loans granted by the RWDC.

The First Rural Water Supply and Sanitation Project, funded by the World nk, followed the RWDC guidelines discussed above concerning the loan/grant/ uity mix. The World Bank loan itself carried an interest rate of 11.6 percent r annum, payable over 20 years including a five-year grace period. About $5 illion was earmarked by the national government as a loan to the RWDC for vel II systems. The government's on-lending rate to the RWDC, however, was ly 4 percent per annum, payable over 20 years with a five-year grace period; e government would bear the exchange risk. Meanwhile, the RWDC lent the nds to the RWSAs at 4 percent interest, payable over 20 years inclusive of ly a one-year grace period. The RWDC used electric cooperatives as its con- it for funds for construction and as its collecting agencies; in turn, one per- nt of the four percent interest charged on the loans would go to the National ectrification Administration, the agency overseeing the cooperatives.

The ADB-funded Island Provinces Rural Water Supply Project would fi- nce level I systems with the DPWH as executing agency. The loan carries a 03 percent interest rate, payable over 24 years including a four-year grace riod. The RWDC guidelines for financing would be followed.

Bilateral sources tend to be easier in their terms. The Fifth DANIDA loan level III systems was interest-free, payable in 18 years semi-annually, after even-year grace period. The on-lending of the national government to LWUA as to be under similar terms. LWUA itself, on the other hand, would have two ndows. The "normal" window would charge 8.5 percent for the first million, 5 percent for the next P5 million, and 12.5 percent for amounts over P7 mil-

lion, with interest capitalized during construction and the first year of operation, and repayment running over 26 years. The "soft" window, which cannot exceed 50 percent of the total loan amount, would not charge any interest from the start of construction up to the fifth year of operations, and 10 percent interest thereafter (from year six onwards). The loan amortization would start on the eleventh year of operations for 20 years.

The different schemes discussed above illustrate the government's commitment to subsidize the water supply needs of the rural population. In fact, a law was passed by Congress providing for the installation of a level I system in every barangay. Varying degrees of partial cost recovery are envisioned for levels I and II systems, and full recovery for level III systems. However, despite the substantial subsidies, the collection efficiency of LWUA for the water district-operated systems had declined substantially, from 78 percent in 1982 to 51 percent in 1987; for the RWSA-operated systems, the collection efficiency is even much lower at 25 percent to 30 percent.

A USAID study in 1988 showed that, based on a sample of RWSAs, the water tariff itself was not a significant determinant of collection efficiency; what was more important was the perceived quality of water services provided. It was noted that collection efficiency declined as the proportion of level II households in the service area increased. It was also observed from the survey that many level II systems soon converted to level III with individual piped connections, thus straining the systems designed for a smaller rated capacity.

With the implementation of the 1991 Local Government Code, local government units (LGUs) are expected to assume the responsibility of providing the domestic water requirements of their constituencies. The rationale for the devolution of functions at the local level includes the following expectations: local level planning that addresses local priorities; cost effectiveness; improved management; and quicker response to problems at the local level. Nevertheless, the DPWH continues to perform the bulk of rural water supply provision, particularly in areas not covered by either MWSS or LWUA.

In March 1994, the NEDA Board passed Resolution No. 4 which delineates agency responsibilities in the water sector. Level I (point source system), level II (communal faucet), and level III (house connections) water supply projects may be implemented by the concerned LGUs within their jurisdiction. LWUA shall implement only financially viable level III water supply projects in areas outside the MWSS jurisdiction. DILG's participation shall consist of general administration and institution building, such as assistance to the LGUs in the formation of RWSAs/BWSAs as well as in the identification of water supply

ystems. MWSS shall be responsible for level III water systems in Metro Ma-ila and adjacent areas. DPWH, together with DILG and the Department of Health (DOH), will provide technical assistance (within a period of about two ears) to LGUs in the planning, implementation, and operation and mainte-ance of water supply facilities.

The Implementing Rules and Regulations (IRR) for this clause of the NEDA Board Resolution were "expected to be finished shortly," according to he Memorandum of Understanding on the Rural Water Supply and Sanitation ector Project signed in May 1995. However, two years after the passage of NBR4S94, the IRR remained to be issued.

In the ADB-assisted Rural Water Supply, Sewerage, and Sanitation roject (RW3SP), a variant of the old rules on cost-sharing is applied: for third-ier (poorer) LGUs, the national government bears 80 percent of the invest-ent cost, while the LGU puts out 10 percent and the beneficiary community hrough the BWSA) takes care of the other 10 percent in cash or in kind (labor nd local materials). For second-tier LGUs, the share of the national govern-ent drops to 60 percent, and the LGU share rises to 30 percent (of which 20 ercent may be in the form of a loan extended by the LGU to the community). he Project, however, shall be limited to 25 of the poorest provinces in the coun-y, including the 20 priority provinces covered by the Social Reform Agenda SRA).

The Department of Agrarian Reform (DAR), meanwhile, proposes a 70 ercent national government contribution for water supply subprojects in its grarian Reform Communities (ARC) Development Project. The 30 percent lo-l contribution shall be borne by the ARC beneficiaries and the LGUs, with no xed guidelines on cost-sharing between the two.

4. Lessons from Cross-Country Studies

The present official attitude towards the rural water supply sector leans ward viewing access to clean and safe water as a basic need. Thus, despite the volution of responsibilities in the sector to the LGUs, the national govern-ent continues to infuse huge subsidies for the provision of at least levels I and systems. External funding agencies seem to share a similar view, with bilat-al sources extending soft loans and grants to finance the sector. Now, how-er, interventions from the center appear to be more focused, particularly on e poorer LGUs which may not have enough resources to meet their mandate.

The Philippines shares this concern with many other developing countries, and a recent review of country experiences identifies key issues and lessons to be learned.[1] The study emphasizes the significance of flexibility in project rules and posits a number of operational questions that must be addressed in implementing rules and procedures for rural water supply development:

1. How are priorities between areas for investments worked out?
2. How are user priorities and concerns incorporated?
3. What steps are taken to ensure that choices are cost-effective?
4. How are incentives built in for sustainable operations and maintenance of constructed facilities?

Developing countries like the Philippines which mandate rules for investment in the level of service based on pre-identified norms are observed to be less successful in their water supply projects than those which follow more flexible rules. Following strict service level guidelines assumes that low-income consumers in a given community have identical preferences towards water service levels. Thus, many BWSAs and RWSAs initially accept level I or II systems from the national government and eventually upgrade to level III service (with house connections). But because the initial system was not designed for the heavier actual load, the system eventually fails. Community-level surveys of RWSAs in the recent past also point to higher capacity and willingness to pay among rural consumers than what has traditionally been assumed (see Appendix A).

The above-cited cross-country study suggests the use of rules that (a) enable investments in service levels to correspond to what people want and are willing to pay for, and (b) incorporate sufficiently robust enforcement mechanisms for sustainable operation and maintenance. It also suggests that sanitation be unbundled from water supply, especially for rural areas; demand for sanitation facilities increases by itself as the water supply system expands. To quote the study's conclusions,

> "Recent projects have focused a great deal more on providing services users want and are willing to pay for; project rules provide incentives for O&M [operation and maintenance] arrangements to be worked out in a sustainable manner; decentralized decision making by communities requires transparency in critical operational procedures, notably in the channeling of

[1] "Designing Water and Sanitation Projects for the Poor: Issues and Lessons from Asia and Latin America," draft, unauthored, undated World Bank document.

> investment funds, provision of information for decision making through technical assistance, etc.; and creating the right incentives among communities to make operational decisions with respect to their own infrastructure is an extremely complex task, and requires a partnership among all key actors: beneficiaries, public officials, NGOs, and [World] Bank staff."

How does the Philippine government's rural water supply policy compare with these suggestions? As pointed out earlier, each line agency (and donor agency as well) dealing with rural water supply seems to have its own set of criteria in identifying beneficiary communities and determining the level of national government support. The DPWH/DILG's RW3SP focuses on the SRA provinces (plus five) and has a tiered set of requirements for local (community and LGU) counterparting. It also has a wide range of criteria, ranging from the size of the population to be served (with the lowest weight of five percent) to a composite scarcity of infrastructure index incorporating factors like water quantity and quality, reliability of the source, and distance from the households (this complicated index having the highest weight of 25 percent). Community commitment, through the formation of BWSAs, gets a weight of 20 percent (see Table 3). The DAR's ARC Development Project, on the other hand, has its rural water supply component tied in with an integrated area development-type package and has a uniform rule across LGUs for local counterpart contributions. In both cases, there appears to be no flexibility in the choice of level of service by the beneficiary community. The *Pal-Tubig* project in Palawan, run successfully by the provincial government with GTZ funding, offers an interesting case of flexible rules on levels of service.

The problem with different agencies having different rules is that mixed signals are sent to the communities. The RW3SP subproject selection criteria, moreover, are not as transparent as they may initially appear to be, for the infrastructure scarcity index (the one with the highest weight) can easily be manipulated to favor particular groups. There is thus the obvious need to introduce reform measures to the sector that follow more closely the lessons learned from Philippine and other country experiences. Outlined in the next section is a suggested minimum basic needs approach at the project level that takes a notion of social pricing into consideration.

Table 3 - Selection Criteria for Rural Communities' Rural Water Supply, Sewerage, and Sanitation (RW3SP)

1.	Population from 120 to 1,200 persons.	5%
2.	Felt water needs by community: (a) present poor water supply quality (b) insufficient water quantity (less than 20 lpcd) (c) distance from households (more than 200 meters) (d) unreliability of source during dry season.	25%
3.	Community commitment through BWSA which: (a) provides required land for facility (b) contributes to capital cost in cash or in kind (c) is among those responsible for and capable of operating and maintaining the facility.	20%
4.	Has poor sanitation condition, high incidence of water-borne and water-related diseases and satisfactory IEE.	15%
5.	Can afford and be willing to pay for water charges.	15%
6.	Proposed scheme using appropriate least-cost technology. (a) Groundwater from springs (especially by gravity) and wells which require minimal or no treatment preferred to surface water. (b) Shallow wells preferred to deep wells. (c) Lower capital cost per capita preferred.	10%
7.	Community with economic development potential. Priority to those in poor or depressed areas with average household income of P1,000/month or lower.	10%

Source: RW3SP Memorandum of Understanding, 1995.

5. Rationalizing National Government Support to the Sector

Most household surveys of willingness to pay for water, especially those poor communities, show maximum demand prices that are way below the ng-run marginal cost of providing the supply of water. The gap is undoubtedly rtly due to a strategic response bias: potential consumers will understate eir willingness to pay if they think that their response will be used as the sis for setting water tariffs. It may be the case, however, that the poor, given eir low incomes, simply do not have the capacity or willingness to pay for an and safe water at the system's breakeven price.

As mentioned earlier, both the Philippine government and the interna- nal donor community appear to espouse the view that safe water is a mini- um basic need, as they continue to infuse huge subsidies for its provision spite the devolution of responsibilities for the sector to the LGUs. How is the rginal social value or "social price" of clean water determined in this context, d how is this applied to the project evaluation process?

First, the State decides on the level of minimum basic need for safe water which everybody should have access (say, 20 liters per capita per day) and e "social price" to attach to this basic need (e.g., P0.50 per liter). The value y be based on the willingness to pay of the median consumer, as gleaned m a demand study. In the social cost-benefit analysis, this price should then used to calculate the economic viability of the proposed project, following the nventional measures of project worth (the net present value, the internal rate return, the benefit-cost ratio).

Only financially inviable but economically feasible water supply projects the social price) may qualify for national government grant assistance. In her words, to merit national government grant support, a water supply project ust produce water at a cost not to exceed this social price. The unit cost shall lude both the capital cost annuitized at the social discount rate (SDR) and erating and maintenance cost.

A numerical example may help to illustrate the procedure. Suppose the pital cost of setting up the water system which will have a life of 25 years is 0 per unit of output. At an SDR of 12 percent, the annuitized capital cost is .275 per unit. If operating and maintenance cost is P0.225 per unit, the eakeven price" is P1.50 per unit. If the social price as determined by the te exceeds or equals this amount, the project is deemed economically (or ially) feasible.

But suppose the poor community's willingness to pay is only P1.00 per unit. The project is then not financially viable, and the LGU, vested with the responsibility to address this basic need, will run into fiscal problems (unless its opportunity cost of capital is very low). How much grant support should the national government extend? The capital subsidy should be that level that would barely make the project financially viable from the LGU's viewpoint. To put it differently, the subsidy should be such that the project would have a financial internal rate of return (FIRR) equal to the LGU's opportunity cost of capital.

The "affordable" capital cost for the LGU will be equal to the actual capital cost (P10 per unit in the numerical example) multiplied by the ratio of net revenue per unit (P1.00-P0.225) to the annuitized capital cost. If the LGU's cost of capital is equal to the SDR (12 percent in the example), the annuitized capital cost is P1.547 per unit, and the "affordable" capital cost is P6.08 per unit. The national government's contribution to the capital cost of P10 per unit will then be 39.2 percent or P3.92 per unit.

The higher the LGU's cost of capital, the higher the national government's level of support is. If the LGU's discount rate is 15 percent, for example, the national government's share rises to 49.9 percent. Obviously, the LGU has an incentive to underdeclare its opportunity cost of capital, so that it can avail of a higher subsidy. This suggests the need for the national government to study LGUs' financial practices, including their borrowing and lending behavior. As proxy for the LGU's opportunity cost of capital, one may use the LGU fiscal class. A sixth class LGU is likely to have a higher cost of capital than a first class LGU.

Appendix A.
Highlights of the RWSA Surveys

The Survey of Member Households

A 1987 survey for USAID of member-households of the level III-type RWSA in barangay San Juan, Balagtas, in the province of Bulacan confirms the rule-of-thumb that the population as a whole spends between two percent and five percent of its income on water. However, the data (based on 150 member households in the RWSA) also clearly show that the poorer income classes pay a larger share of their income for water, and the share of water in income drops as income increases (Table A.1). Thus, families belonging to the bottom 20 per

nt, with mean monthly income of P691 and highest monthly income of P1,200 n 1987 prices), spent about P60 per month on water (or 8.9 percent of their ncome if weighted, 12.1 percent if the simple average is taken).

Table A.1 - Monthly Water Consumption by Quintiles

rcentile	Monthly Family Income (in 1987 prices) Highest	Ave.	Percent of Family Income Spent on Water Weighted	Simple	Spent on Electricity Weighted	Simple
20th	1,200	691	8.68	12.05	8.19	10.67
40th	1,913	1,555	3.88	3.89	4.53	4.52
60th	2,864	2,383	3.49	3.50	3.87	3.96
80th	4,663	3,835	1.88	1.93	3.21	3.25
00th	29,500	8,821	0.93	1.11	1.61	1.84
verage			2.07	4.50	2.80	4.85

The bottom 20 percent of families which were members of the RWSA uld also be observed to be spending more on water than they did on electric- y. However, for the higher quintiles, the share of electricity in family income t to be higher than that of water, indicating a more income-inelastic demand r water than for electricity.

The main implication is that, in the design and financial planning of ru- l water supply systems, the two-to-five percent rule-of-thumb should not be plied mechanically. In particular, this rule does not apply evenly across all gments of the population. The poorer families may be willing to pay a bigger hare of their incomes than has traditionally been presumed.

The household survey also shows that for the bottom 60 percent of the pulation, the electric bill is a good indicator of how much potential members the association may be willing to pay for a water connection. This is a rela- vely cheap way of gathering information in planning a water supply system. ecords of electricity consumption can easily be obtained from the local power ility company.

The USAID survey also asked the households how much they were will- g to pay for their own connection, and invariably, the respondents declared a

demand price much lower than how much they had actually been paying. The average declared price was only P26 per month, while the average amount actually spent was P72 per month. This implies that in the determination of tariff rates, the use of "willingness to pay" measures as gathered from a survey of the potential beneficiaries should be avoided.

The Survey of RWSAs

Water Consumption Analysis

A total of 52 RWSAs were included in the USAID study, 37 of them coming from Luzon and the others spread in the Visayas and Mindanao. The study shows that while most of the associations started out as level II (public faucet) systems, they soon upgraded to level III (with individual connections). At the time of the 1987 survey, only 26 percent of the beneficiary households were still under a level II system; the rest had level III. The consequence of this upgrading was that the original level II systems were put under great stress as they get converted to evel III, with the corresponding increase in per capita water consumption.

Four three-month periods considered in the analysis were: fourth quarter 1985, second quarter 1986, fourth quarter 1986, and second quarter 1987. Annual growth rates in different dimensions of water consumption are given in Table A.2. For household membership, volume of water consumed, amount billed and amount paid, the growth rate between the fourth quarter of 1985 and the fourth quarter of 1986 (period A) was much higher than the growth rate between the second quarter of 1986 and the second quarter of 1987 (period B). At the same time, however, the delinquency rates, whether in terms of households not paying or the amount billed but not paid, increased significantly between the two periods.

Table A.2 also gives the numbers of RWSAs which experienced increases, decreases, or no change at all over a one-year period. It can be seen that in general, more RWSAs experienced growth rather than stagnation; unfortunately this was true not only in the "positive" variables (household membership, water consumed, amount paid by households), but also in the "negative" variables (number of delinquent households, amount of delinquent accounts).

Table A.2 - Annual Growth Rates of Water Consumption (RWSA Files)

	Annual growth rate (%)[1]	RWSAs with		
		increase	no change	decrease
Household membership				
2Q86-2Q87	2.3	30	5	13
4Q85-4Q86	6.5	30	7	12
Water consumed				
2Q86-2Q87	33.3	25	1	7
4Q85-4Q86	81.2	20	1	8
Amount billed				
2Q86-2Q87	12.9	30	0	14
4Q85-4Q86	63.0	33	1	6
Amount paid				
2Q86-2Q87	16.3	29	0	20
4Q85-4Q86	49.9	37	0	14
Delinquent households				
2Q86-2Q87	163.0	21	0	12
4Q85-4Q86	38.9	15	2	15
Amount delinquent				
2Q86-2Q87	456.3	21	0	13
4Q85-4Q86	111.0	19	0	8

[1] The annual growth rates are based on simple averages across the RWSAs; they are not weighted by RWSA size.

Determinants of Collection Efficiency

For collection efficiency, two measures were tried out in the regression analyses: the proportion of nondelinquent RWSA member households and the proportion of the value of nondelinquent collections (measured in pesos). It may be observed that there had been some deterioration in collection efficiency between end-1985 and mid-1987.

Several explanatory variables were tested against collection efficiency measured in both manners discussed above, but only two came out significantly, and only for nondelinquent collections for the second quarter of 1987 (NC87).

The two explanatory variables are perceived water quality (WTRQ) and the proportion of Level II households being served (L2HH). The means and standard deviations of the variables and the regression results are presented in Table A.3.

Table A.3 - Determinants of Collection Efficiency

		Descriptive Statistics		
		Mean	S.D.	N
Percent of nondelinquent households, 2Q87	NH87	78.135	18.412	42
Percent of nondelinquent households, 4Q86	NH86	79.911	19.126	45
Percent of nondelinquent collections, 2Q87	NC87	76.237	20.760	39
Percent of nondelinquent collections, 4Q86	NC86	80.658	15.931	39
Percent of Level II households, current	L2HH	26.022	31.347	52
Water quality index (as perceived by RWSA)	WTRQ	5.577	0.987	52

Regression Analysis—Dependent variable: NC87

	(1)	(2)	(3)
Constant	84.2184	31.7095	49.5474
L2HH	−0.2740		−0.2204
	(−3.03)		(−2.40)
WTRQ		8.1571	5.8878
		(2.61)	(1.91)
R SQUARED	0.2029	0.1591	0.2780
S.E.E.	16.1609	16.5982	15.5986
N	38	38	38

Note: *t*-values are in parentheses.

It can be seen that L2HH has the expected negative coefficient: collection ciency declines as the proportion of level II households increases, perhaps to the free rider problem inherent in level II systems. Perceived water qual- has a significantly positive effect in this case. It would seem that households ress dissatisfaction with water quality through delayed payments rather n through reduced water consumption, as the water quality variable is not a nificant determinant of water consumption itself. These two variables (L2HH l WTRQ), however, do not significantly influence the proportion of house- ds with delinquent accounts. They affect only the total amounts collected ative to the amounts billed.