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The Hague, The Netherlands

What Price Water?

User participation in paying for
community - based water supply

10

Occasional Paper Series

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WHAT PRICE WATER?

User Participation in Paying for Community-Based Water Supply

with particular emphasis on piped systems

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FOREWORD

All improvements in water supply call for money and other resources, not only for the initial investment but perhaps more importantly, for operation, maintenance and repair. If water supplies are to be sustainable, there is clearly a need for a continuing as well as an initial financing source and commitment.

Over half way through the International Drinking Water Supply and Sanitation Decade it is evident that only part of the necessary overall resources are being made available. Most of these resources moreover go towards investment costs. At the same time, the expanded construction of small community water supplies over increasingly large areas raises the demand for financing of recurrent costs. National budgets cannot realistically be expected to increase substantially for this purpose in the near future. Nor can external support: while most international and bilateral donors will support structural measures such as training and institution building, most now state that cost-recovery should as a minimum meet the operation and maintenance costs of the sector as a whole. There is increasing interest therefore in three complementary ways of bridging the gap: by reducing costs through development of low-cost technology and levels of service in consultation with the users; by cutting back maintenance costs through supporting community-based maintenance whenever possible; and by moves to supplement resources through financial contributions from the user-communities themselves.

It is especially the third of these approaches which is discussed in this publication. It can be seen as an attempt to catalogue community financing systems: what mechanisms for cost-recovery are available, under what circumstances could they be applied and what are their advantages and disadvantages? Special attention is paid to introducing the options to the community and organizational development at the local level to support the chosen revenue generating system.

The main aim of the paper is to provide a set of practical guidelines for project staff with both a technical or social background who are involved in the planning, implementation and operational management of piped community water supplies. Its contents could also be useful background for policy-advisers considering the ins and outs of charging for rural and peri-urban water. An extensive subject index and selected readings have been added to facilitate the paper's use as a reference document.

The publication was also initiated in an attempt to remove some of the mysticism and specialist jargon surrounding financial issues and to discuss them in a practical way. The text is highlighted by illustrative cases in indented examples, taken either from the literature or from personal experiences of the author and contributors. Most of these cases refer to small-scale experiments or projects. For more general policy decisions on the best kind of financing system, more hard data is now needed on the wider applicability and financial and social results of the various approaches.

Initially the paper was prepared for use in the IRC-supported Public Standpost Water Supplies (PSWS) demonstration project. However, it is

anticipated that its contents may be found useful for a wider readership and for this reason it has been published in the IRC Occasional Paper Series. A companion literature review and selected bibliogaphy is in preparation by IRC.

Whilst the emphasis of the current publication is on funding community water supplies, particularly piped schemes, it is intended that a future IRC study will address the complementary issue of community-based financing of sanitation improvements.

We hope that the present work will prove a helpful development in bringing community-based financial management into focus and in promoting both its further discussion and the development and application of appropriate revenue generation methods in the developing countries. When more experiences have become available, it should also become possible to formulate more general policies on community-based financing. Critical response on this work, contributions of views and experiences and collaboration in introducing and monitoring new approaches would therefore be welcomed as valuable means of further developing the subject area.

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1. THE CHALLENGE OF COST-RECOVERY

Many countries have set targets to provide every community with improved water supply and sanitation. The proclamation of the International Drinking Water Supply and Sanitation Decade has demonstrated the universal intention and the dedication of national governments in meeting this target, if not always as soon as 1990.

However, apart from the initial investments, an ongoing committment sustained by cost-recovery is also necessary to ensure that improved water supplies continue to function, ideally for 365 days a year. If funds are not available to meet the costs of operating, maintaining, repairing and upgrading the water supply, the system will deteriorate. This deterioration both increases the costs of getting the system into shape again, and decreases the preparedness of the users to pay for the service. A downward spiral is set into motion, causing loss of initial investments, and loss of confidence and support of the users. Good financing and financial management are thus important (though not the only) conditions to create and maintain well-functioning improved water supplies in all communities.

1.1 More systems to be built and kept functioning

In the first three years of the Decade, improved water supply and sanitation facilities were constructed for more people than in the ten years preceding it. This excellent achievement must now be consolidated by keeping these facilities functioning and in use. Alongside this for over three times as many people, improved water supplies still need to be constructed while the number of sanitation facilities still needs to increase by more than 12 times ([1]).

The double task of maintaining a growing number of water systems scattered over increasingly large areas while continuing new construction poses a great challenge to national governments. More

([1]) WHO (1986). International drinking water supply and sanitation decade: mid-decade progress review. Report by the Director-General (A39/11), Geneva, Switzerland, WHO.

funds and capable manpower are needed, and organizational structures adapted to cope with changes in scope and types of service. At the same time, many governments struggle with low budgets and competition for skilled staff from the often better-paying private and commercial sector. Shortage of funding and trained personnel are the two highest ranking constraints listed by the countries themselves at the beginning and halfway through the Decade (1).

The costs to be covered include both capital or investment costs, and recurrent costs. Capital costs are all costs needed to construct, expand, upgrade or replace a community water supply. Recurrent costs include the cost of operation, maintenance and repair of completed systems, and also agency support for community hygiene education and sanitation improvements, for community-based maintenance and management, such as training and procurement of spare parts, and for monitoring and evaluation of programme results.

1.1.1 Shortage of maintenance funds

Worldwide, the required annual budget for rural water supply investments and recurrent costs is estimated to amount to US $12 to 15 billion. Total investments from national and external sources do not yet meet these requirements. External sources during the first half of the 1980s amounted to about US $2 billion per year (2). The greater part of these funds went to the African region. The external financing of water supply and sanitation improvements in this region amounted to 84% of all investments in 1983. While these investments greatly increased the construction of better facilities, they have also placed heavy demands on the absorption capacities of the national organizations involved. In contrast, national resources have been a major source of funding for programmes in south-east Asia, (53%), the

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(1) See WHO (1984). The International Drinking Water Supply and Sanitation Decade: review of national baseline data. (WHO offset publication No. 85), Geneva, Switzerland, World Health Organization, and decade monitoring statistics.

(2) Bastemeijer, T. and Visscher, J.T. (1985). Maintenance systems for rural water supplies: state-of-the-art. The Hague, The Netherlands, IRC, p.22.

Eastern Mediterranean Zone (58%), and Latin America (60%) ([1]). In the absence of more external financing of capital costs, the majority of these resources has been used for construction of new systems in uncovered areas.

In both cases the extensive construction of improved water supply systems in a relatively short period has rapidly increased the problems of operation and maintenance. The following examples give an idea of the scope of financing problems in keeping completed systems operating.

In India, the supply of 300 million people using hand pumps and 200 million people using piped water would involve a national annual expenditure of Rs 9200 million (about US$ 900 million) ([2]). This amount is equal to 37% of the total budget for rural water supply improvements in five years (1980-1985, Sixth Five Year Plan). A study in Burkina Faso, West Africa, estimates that to maintain and eventually replace the existing 5000 hand pumps, an annual budget of F.CFA 300-378 million (about US$ 1 million) is needed. This amount is 70 to 80 times the total 1979 annual budget for installation and maintenance of pumps ([3]).

External funding for covering recurrent costs is unlikely to become available. Most international and bilateral donors now state that as a minimum, the costs of operation and maintenance should be met in-country for the sector as a whole. It is however agreed that the actual means of financing and cost-recovery should not negatively affect the health objectives of sector developments. This would for

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([1]) WHO (1986). The International Drinking Water Supply and Sanitation Decade: review of regional and global data (as from 31 December 1983). (WHO offset publication No. 92), Geneva, Switzerland, World Health Organization, p.7.

([2]) Lindeyer, E.W. and Bhimarao, N. (1984). How to pay for rural water, both a government's and a beneficiary concern. Paper presented at the IWWA convention, Baroda, India, 23 January 1984, p.18.

([3]) Bastemeijer and Visscher (1985). op.cit., p.2.

example be the case when only higher income areas and populations are served by conventional programmes. It is also agreed that while direct external financing of recurrent costs is undesirable, structural support can be made available for strengthening national, regional and local capacities for maintenance and maintenance financing ([1]). In this context, both national governments and international and bilateral donors are increasingly interested in the involvement of the community in maintenance and maintenance financing. Major purposes of this involvement are the reduction of recurrent costs to the government, by training communities for local maintenance and management, greater cost-recovery through user payments, and more effective functioning by giving the communities the necessary authority, training and access to spare parts for local management and financing of maintenance.

1.1.2 Increased coverage

With limited budgets and large and growing populations still to be served governments also want to go on constructing new services. In choosing the way to realise this objective, they can consider two types of strategy. The first concerns the choice of technologies and levels of service. Basically the choice is between providing "all to some", "some to all" or a combination of the two. Providing "all to some" refers to the installation of higher-cost technologies and higher service levels in selected communities, such as piped water supplies with electric or diesel pumps wherever necessary, with private house connections, often multiple and inside the houses. "Some for all" programmes aim at constructing water systems with the lowest possible capital and recurrent costs and a basic service level in every community, before starting on higher level improvements. In reality the two programmes often exist side by side, but may need better co-ordination to avoid projects overlapping in some areas while

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([1]) OECD/DAC (1985). Improving aid effectiveness in the drinking water supply and sanitation sector: conclusions and recommendations emerging from DAC consultations. Paris, France, OECD Development Assistance Committee.

particular technology remain unserved ([1]).

The second strategy to increase coverage is to reduce unit investment costs and/or recover all or part of the overall costs through involvement of the communities to a level that is both acceptable and affordable for them. The resulting larger funds help to continue the work in unserved communities. This publication focuses especially on this second option.

1.1.3 Community contributions to recurrent and capital costs

Cost recovery may refer to capital or recurrent costs, or to both. In some programmes communities pay only the recurrent costs of their improved water supply. Payments may be made directly and in cash for maintenance and repairs carried out by the water agency. However, in many cases it is too costly when an external organization carries out all maintenance and repairs and waiting times for a mobile team are too long to make this a feasible solution. Water supply programmes covering many communities in large areas therefore frequently opt for community-based maintenance and management. In this system daily maintenance and simple repairs are done and paid for locally, while the agency changes its task from direct implementation to the higher-level services of training community members, procuring equipment and spare parts and monitoring and evaluation of results. External maintenance and repair are limited to those jobs that are beyond community capacity. Sometimes, these external services may still be provided and financed by area-based government staff.

([1]) Paraguay offers a good example of this co-ordination. During a conference in 1982 it was decided that the National Service of Environmental Sanitation (SENASA) would concentrate its rural piped water supply programme in some areas. Expatriate volunteers would be stationed in the other areas to assist communities in making improvements to their water supplies with local means. The names of local craftsmen and community organizers are passed on to SENASA so that when the government programme is expanded to new areas, local skills will be used.

Elsewhere communities either have to pay for these services or involve a private (but trained) mechanic in their area.

There are also programmes, such as the handpump-well programme in Burkina Faso where the community not only pays for and executes all community-level maintenance but also sets aside reserves for the replacement or extension of the village water supply. Only the construction costs are financed fully by the donors which support the various regional water supply programmes in the country. In some of these programmes it is also possible for the community to choose an improved open well instead of a handpump-well, when its members fear that there will be problems with the proposed maintenance or financing of recurrent costs ([1]).

Other countries, especially in Latin America (e.g. Argentina, Bolivia, Colombia, Ecuador, Peru) have established piped water supply programmes in which households taking a private or shared yard connection not only pay all recurrent costs of their improved system but also part of the capital costs. The contribution to the capital costs is partly in the form of a direct cash contribution of the user households, and partly in the form of a soft loan to the community for the construction of the scheme. This loan must be paid back by the cooperative or association of water users through monthly installments over a predefined period.

The actual proportion which the community has to pay back depends on the local economic circumstances. In the Philippines for example, contributions to capital costs may range from 100% to 0%. In Colombia the value of the loans varies from less than 20% to over 40% of the total construction costs. The remainder is a grant from the state and international, bilateral or national donors. In the programmes in Colombia, Peru and Guatemala user households are given the opportunity

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([1]) IRC (1987). Community participation including the involvement of women in water supply and sanitation projects. A compendium paper prepared for the Development Assistance Committee of the Organization for Economic Co-operation and Development on request of the Directorate General of Development Co-operation of the Kingdom of the Netherlands, The Hague, The Netherlands, IRC, Appendix I.

to pay part of their contribution to the construction of their piped water supply in kind, by providing voluntary labour for trench digging, transport and pipe laying, and providing local materials, such as sand and gravel. Payment of part of the construction costs in labour instead of money makes the system more affordable to a larger number of households than when all payments have to be made in cash ([1]). The cash contributions and loan repayments are used to replenish a government revolving fund established to finance new investments in other, unserved communities ([2]). However, the high rate of inflation has greatly reduced the value of these loan repayments. Thus, in most cases additional state and donor inputs for construction have been necessary.

1.2 Matching community services and community payments

A limiting factor of some large-scale water programmes in South America is that they offer only one level of service (private yard connections) to each community. Communities submitting a request for a community water supply system are thus selected on the basis of technical as well as socio-economic feasibility of this particular water system. This implies that as the programme goes on, satisfying the conditions in the remaining communities with lower feasibility becomes more and more difficult.

The programme in the Philippines has therefore introduced the principle that each community in need of an improved water supply is assisted to choose the type of technology which it can afford: handpump-wells; a piped system with metered standposts for small groups of 7 to 10 households, or a piped system with unmetered house

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([1]) Depending on the type of technology and total length of pipeline well-organized voluntary labour has been reported to reduce construction costs from around 4% for piped systems with expensive pumping equipment to 30-40% for piped gravity systems and 60% for hand-dug wells. However, better monitoring is needed on the extra costs of training community committees in organizing and supervising this labour to get a clear picture of ultimate savings through voluntary labour.

([2]) On the advantages and drawbacks of revolving funds for the water sector, see Langeri, L. (1986). Water development funding. World Health, December 1986, p.18-19.

connections but with a restricted flow rate of 0.4 litres per minute (1).

In most cases it will be possible to match the type of technology and level of service to the carrying-capacity and water use patterns of the community to a degree acceptable to both agency and community. However, there are occasional exceptions, either because no other solution is technically feasible, or because the programme does not, or not yet, provide for alternative solutions. An example is the piped water supply programmes which provide pumped services rather than other technologies in cases where gravity supply is not possible.

The proportion of capital and/or recurrent costs which a community can bear in the case of a pumped system is usually much lower than with a gravity fed system. It is therefore not always realistic to expect that all costs of operation and maintenance are financed locally (2). One policy decision to be taken in such cases is to provide some kind of subsidy or material support, perhaps in the form of cross-subsidies from high-income communities with a low cost system, such as a gravity supply in the same or adjacent areas (3). While such cross-subsidies are sometimes difficult to implement on a national scale, they may be more feasible at provincial or district level.

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(1) For successful application, the installation of flow restriction should be fully supported by the users. See Okun, D.(1982). Financing water supply systems in E.J. Schiller and R.L. Droste (eds). Water supply and sanitation in developing countries. Ann Arbor, Michigan, USA, Ann Arbor Science.

(2) In one department of Colombia, monthly water rates varied from 2 to 50 pesos. Especially schemes with high operating costs had great problems with non-functioning and loan repayment. IRC Occasional Paper 19, p.9 and 22-25.

(3) A study in Honduras found that an overall monthly rate of L 1.65 would cover all recurrent costs of 59 gravity and 11 pumped water systems. Taken separately, the cost-recovery rate of gravity systems would be L 1.40, for pumped systems L 3.19. Uzin, L. (1976). Tariff manual for rural water supplies. Tegucigalpa, Honduras, PAHO, p.9.

Water agencies wishing to mobilize financial resources from water users are also confronted with the more general issues of high overhead costs of many externally executed projects, low payment capacities of rural and urban fringe communities and distorted water price policies.

Training national teams in designing their own projects and implementing them either through their own agencies or through well-qualified and supervised contractors would not only reduce the direct construction costs but also allow national staff to gain in experience, skills and self-confidence. The ultimate choice on this issue lies with national policy makers and donor agencies who must weigh long-term development benefits against short-term programme objectives of large scale and high quality construction in relatively short periods.

Cost recovery of the construction and/or recurrent costs is limited by the low payment capacities of the users themselves. In many countries there is an increasing demand on low-income rural and urban fringe households to contribute directly to social services, not only water supplies, but also health care and education. When these households cannot afford to pay the minimum costs of a basic domestic water service, one general policy option is to increase their income, for example through more realistic prices for agricultural outputs and better, yet generally affordable agricultural production techniques.

No less important is the pricing policy within the water sector itself. The common practice of subsidizing drinking water supplies in high-income urban areas means that less funds are left for water supplies to unserved and underserved populations in rural and urban-fringe areas. Steeper progressive rates (increasing with useage) in urban areas would make it possible to recover the costs of urban systems, leaving more funds for a basic water supply and sanitation service in lower income areas. Under such a system, residential consumers which have multiple house connections, governmental and social institutions and commercial and industrial users all pay higher charges for all or some of their water. This is feasible in the sense

that families with higher incomes often spend a much smaller percentage of their income on their multi-tap water service than poorer families with a much lower level of service. Indeed, until and unless high income urban consumers pay the full costs or an agreed proportion of the total costs of their water service, it is unreasonable to expect rural and urban-fringe people, who generally have much lower incomes, to contribute substantially to the running costs of their own services.

In this respect stricter action should also be taken to enforce payment discipline for urban water systems. Non-payment of water charges often is most serious amongst the largest users in the government and the private sector ([1]). Services such as water supply have to be paid for and any subsidies made should be explicit, not hidden through non-payment or late-payment of bills. Only when all consumers, whether private or public institution or household have to pay their water bill can the efficiency of government transactions be sustained and payment morale kept up. In the same way practices of transfer payments (i.e. payments in the books only) between one government service (the water supply) and another (e.g. the public health system) should also be discouraged. Such practices do not make these services better or more affordable to low-income families. On the contrary, they reward inefficiency and increase the chances of a breakdown in the water supply due to lack of finances, resulting in deterioration of health conditions in the community ([2]).

([1]) OECD, (1985), op.cit., p.7.

([2]) In total, more than 80% of infectious diseases are transmitted through use of unsafe water and insufficient hygiene.

2. DESIGNING FOR COST-RECOVERY: THE VIEWS OF THE USERS

The basis for satisfactory community-based financing and financial management is laid during the planning of the community water supply. Local financing will not be forthcoming when the system does not meet the needs, interests and payment capacity of the various user categories. More and more projects therefore consult the community members during local project planning and involve them in the final selection in type of technology, level of service, type of user facilities, and planning of local financing, maintenance and management systems.

2.1 Early consideration of financial consequences

Because the choice of technology and community-level design greatly affects local costs and management demands, the implications of a proposed system or system options, and what each party should contribute should be discussed with the community during the early planning stage.

The attitudes of the agency staff are very important in this process. The temptation is sometimes strong for external technicians to behave as superior experts who are going to build an improved system for ignorant villagers. However, the community will determine the ultimate success of this technical expertise, by maintaining and managing the community water supply largely with local funds and human resources. Community members should therefore be treated from the beginning as partners, not simply as beneficiaries. This means finding out what various user groups want and can provide in realistic terms. How much will they pay for different solutions, what community inputs for construction and maintenance will be needed for a certain type or types of systems, and how feasible are these inputs? A process of negotiation on what is wanted ideally and what is feasible in practice will see to it that the emerging outcome is acceptable to all.

This acceptability is very important for the health benefits of the project. When project staff and community want the improvements to

have a positive impact on public health they will have to plan a system or combination of systems that all families will use throughout the year, at least for drinking, that increases water use for hygiene, and that in areas of schistosomiasis is also used for clothes washing and bathing. In addition, the community will have to identify together with the appropriate field-staff what other risks of transmitting water and sanitation related diseases exist locally and develop and carry out an action plan for elimination ([1]). This means that the financial and manpower implications of additional health education and sanitation improvements must be part of the overall planning and decision-making process.

Such joint planning also brings out the community's own practical expertise on the physical environment, social relationships, variation in payment capacity and other aspects of importance for making proper choices. It is therefore being increasingly accepted that ultimate decisions in local planning and design should be made jointly by project agency and project community.

It is sometimes argued that this kind of decision-making is very time-consuming and thus costly. Although it cannot be denied that more time is needed to decide things with others than for others, the inputs need not be excessive. Good planning is essential in this respect. While one community makes up its mind after the most feasible and desired options have been discussed, the work can go on in other communities where the implementation stage has been reached. Furthermore, communities must be helped to understand that they cannot have unlimited time for decision-making and that compromises may have to be agreed on.

For more successful community water supplies, the project agency will have to make separate reservations for 'software' activities such as those mentioned above, together with the 'hardware' of pipes and pumps. There will be a need for field workers experienced in joint decision-making and in supporting community health education and

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([1]) For the planning of participatory and community based health education, see M. Boot (1984), Making the links: guidelines for hygiene education in community water supply and sanitation. (Occasional paper series), The Hague, The Netherlands, IRC.

sanitation programmes. Some technical agencies have employed and trained special promoters for this purpose, at the level of field technicians. Others cooperate with community development and health services, with each category of field staff trained for their own tasks. Again others have recruited technical field staff for water projects on the basis of their interest and skills in communication with the community and have trained them in both technical and social tasks.

With more community involvement in planning and follow-up, some extra or more prolonged visits to the project community will generally be necessary for which budgetary and transport arrangements have to be made. Field procedures need to be developed and tested, including an indication of the total input needed for adequate results. Training programmes for field staff and communities must be set up and educational materials for both groups developed, tested and introduced.

It is hard to give an idea of the total costs associated with these activities. They depend among other things on the complexity of the technology, the distances between communities, existing community capacities and socio-cultural differences between the communities or areas. Costs will also be higher in the initial stages, not only because of the extra development costs but also because both agency and community may have no earlier experience in working together. It is quite likely that once both parties have become familiar with participation processes, the speed of implementation can be increased in new communities. Also there may be less need to discuss options which have been rejected in other communities with similar conditions ([1]).

So far, few hard data are available on the total cost of a community participation component. One handpump-well programme gives an overall figure of 17% of the overall project costs. This total includes a relatively high, but unspecified percentage of development costs by

([1]) For the value of a pilot approach as a learning process see Glennie (1983), op.cit.

expatriate staff ([1]). In another programme, mainly developed by nationals, the proportion spent on participation and hygiene education in a pilot project in 58 villages amounted to 7% ([2]). An early estimate based on cost figures from Guatemala is that community participation takes 10 to 12% of total programme costs excluding the initial development costs ([3]).

2.2 Methods of community consultation

To decide what project options to consider, the planner must work closely with the people in the communities or area who will use and maintain the new systems. This can be done in several ways. In the preparatory phase, the project can find out informally from the local leaders and the different categories of users (rich and poor, men and women, domestic and productive users) what their practices and needs are in water supply and sanitation and whether and how much they are ready to pay.

To inform the people about the project and negotiate about a design acceptable to all, the local authorities can be asked to organize one or more public meetings. General participation can be stimulated by holding these meetings at a time and place convenient to all, and inviting both men and women to attend. In larger communities, decisions can be made with a representative community water committee, and be laid before a representative public meeting for review and approval. Where it is difficult for women or poor people to raise questions or give diverging viewpoints, they can be consulted separately in an informal way. To consult the women, the local leaders

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(1) Visscher, Jan Teun and Hofkes, Ebbo (1982) Rural water supply development: the Buba Tombali Water Project 1978-1981. The Hague, The Netherlands, Ministry of Foreign Affairs, Directorate General for Development Co-operation; The Hague, The Netherlands, IRC; Bissau, Guinea Bissau, Ministry of Natural Resources.

(2) Unpublished data, PMO/IRC Project for the Development of a Community Participation Component in the Tanzanian Rural Water Supply Programme.

(3) Personal communication from David Donaldson, Pan American Health Organization. This investment should be seen against an average cost-savings of 20% of construction costs by voluntary labour and full financing and management of recurrent costs by the community.

can also be asked to organize a second meeting for women only. Involvement of well-trusted male and female community workers such as local health workers, teachers, and community development workers, can also make it easier to get the views of the people through interviews and informal discussion.

Discussion and observation of traditional water use and maintenance practices during the pre-planning stage in selected communities representing the various socio-economical and ecological conditions of the area enables the project to build on positive customs and management practices ([1]). Planning can further be improved by learning from the experience of the first projects that have been completed in an area. Finding out the views and experiences of the users with regard to the planning, construction, maintenance, use and management of the water systems can help the agency to improve its procedures in other villages. At the same time the agency and communities concerned can discuss the evaluation results and decide what improvements both parties will make in the villages where the evaluation has taken place. Further follow-up visits can show if the measures decided on have actually worked. Thus, through the additional input of periodic monitoring visits and joint problem solving, a learning process is established that benefits the agency and project communities alike, and contributes to the first goal of an improved water supply: satisfactory functioning and use through good management and management support.

2.3 Degree of community choice

A logical consequence of holding the users responsible for local financing and management, is that they are also given a say in the choice of technology and design of the system. The degree of this say varies between programmes.

The most common type of programme often has only one type of

([1]) For a more detailed discussion of traditional patterns of water use and source management, see IRC Technical Paper 22, p.13-15 and p.25-28.

technology and service level available. Thus, a piped water supply programme may offer only piped systems with public standposts, or sometimes only piped gravity systems with public taps. A feasibility study serves to determine the suitability of the particular project for the selected communities.

Alternatively, it is investigated first where the programme can be implemented. Individual projects are then implemented on the basis of priority allocations and logistics or on the basis of total coverage of the area concerned with the selected type of technology.

Sometimes the feasibility study for such programmes is still limited to technical aspects only. In other programmes, socio-economic conditions are assessed as well, and communities consulted about their water and health problems, organizational capacities and interest in and payment capabilities for an improved water supply and sanitation. When the system is found technically and socio-economically feasible, a preliminary design is made. In programmes without further community involvement, it is assumed that the subsequent plan has been sufficiently adapted to user needs and capacities to ensure that the new facilities will be generally adopted and cared for by the users.

On the other hand, programmes with more direct community involvement present the resulting plan to the communities concerned in meetings and assemblies and discuss its implications and benefits. Communities in which the conditions are not suitable for a piped supply are either referred to another programme (e.g. wells) or simply told they cannot be served. Occasionally, the acceptance of the proposed project is no more than an empty formality, as both agency and community know that the system will be built anyhow, whether the community participates in it or not. But in many cases, acceptance is a serious matter, with thorough discussions of local consequences and valuable adaptations to local project designs, and with both parties officially committing themselves to the "deal" decided on in a project agreement or formal contract.

Less usual are programmes where several possibilities of type of technology and level of service are studied, and the financial and

other implications of each option reviewed with the community. These other implications may include the water quantity, water quality and risks of contamination, reliability of the system, amount of voluntary labour involved, accessibility of water points in relation to use by all throughout the year, additional user facilities for washing, bathing or cattle watering and possibilities for later upgrading. When in the ensuing discussions it is agreed that perhaps the favourite option is less advisable for technical or socio-economic reasons, the agency will assist the community to realize another, more realistic type of improvement.

This may not only mean that the service level of the piped water supply is adapted to what the consumers want and will pay for, but also that a different technology may be chosen, that the design is made with an eye on future upgrading, or that the system is supplemented by other types of technology. A piped system may for example consist initially of one or a few communal water points, with later expansion to group or yard connections. In other cases, hand pump wells may be prefered or the piped system may be supplemented by improvement of traditional sources. The main point is that the process results in the choice of a system that fits local needs and resources and is acceptable to the agency as well as the users.

3. SHARING THE COSTS: COMMUNITY FINANCING OPTIONS

One of the most important decisions in planning a community-based water supply is the actual financing system to be adopted. There are many ways in which rural and peri-urban communities can participate in the financing of capital and recurrent costs of their water supplies. Two main options are **community fund-raising** (section 3.1) and **regular user charges** (section 3.2). **Water vending** (section 3.3) and **indirect taxation** (section 3.4) are only recommended in specific cases. Each of the options has its own advantages and disadvantages which should be fully considered in the planning of an improved water supply, at the programme level as well as in local planning with the community itself. A fold-out summary table of the available options is given in Appendix A.

3.1 Options for community fund-raising

A common form for financial participation is community fund-raising. A characteristic of such fund-raising is that families do not pay regular contributions towards the cost of the community water system. Instead, money is periodically accumulated in other ways. Community fund-raising is particularly suitable in systems with standposts or communal water points. This is because it is difficult in these circumstances for an administrative organization to decide who are users and who are not. In piped systems with private taps and/or group connections it is easier to make household contributions obligatory, since users are registered and control on actual use is possible.

Community water funds can be created through voluntary fund-raisings, the use of other community income, or the establishment of a community revolving fund or production cooperative. A summary of these options and their main characteristics as discussed in subsequent sections is given in Table 1. The funds may be used to cover part of the construction costs and/or recurrent costs, until the money runs out. This happens less quickly when the money is placed in a bank to gain interest, and can be prevented if it is replenished from time to time.

Deciding factors on whether the occasional use of community funds for recurrent costs is appropriate are the frequency and costs of regular operation and maintenance.

Table 1: Options for community fund-raising

Type	Setting	Purpose	Organization	Methods
Voluntary funds	in communities with a tradition of fund-raising, seasonal income, and a good knowledge and control of payments according to household capacity and benefits	financial contributions to construction; occasional contributions to maintenance and repair of simple systems with public water points	traditional leadership, voluntary organizations, e.g. women's groups, tap organizations	targets are set and funds collected periodically through meetings, house-to-house collections, bazaars etc. Funds are collected in advance or when required
General community revenue	in communities with own sources of income and a water supply with public facilities	annual maintenance and repair, financial contributions to construction, depreciation and expansion where possible	local government, community water committee or sub-committee	reservation of funds based on the estimated costs and net annual income of the community; cost-reduction or income generation where necessary
Cooperative funds	water supply initiated and financed through production cooperative or village revolving fund; no direct payments for water	annual maintenance and repairs; repayment of construction loan; depreciation and expansion where possible; service for members with or without facilities and for rest of community	cooperative's executive committee, community water committee or sub-committee	reservation of funds based on estimated costs and income from cooperative ventures, interest and/or member fees; cost-reduction or income generation where necessary

Hydraulic rams, piped gravity supplies with public standposts and wells with hand pumps or some kind of fixed bucket system do not need paid operators. Also, the workload and skills for daily maintenance of the water collection points are low, so that the work can often be done on a voluntary basis by the users, a tap or well committee or a waterpoint caretaker. Occasional larger jobs can often be carried out with the voluntary labour of the community as a whole, provided good local leadership and a sense of community ownership and appreciation of the water supply are present ([1]). In this way, only larger, paid

([1]) See for instance Glennie (1983), op.cit., especially p. 43, 98, 105.

maintenance and repairs and the depreciation of the system need to be covered by the funds ([1]). When other recurrent costs have to be met as well, such as the salaries of operators and watchmen and fuel, the total annual cost may become too high to be paid on an irregular or non-specific basis. Regular user payments as covered in the second part of this chapter will then be more appropriate.

3.1.1 Voluntary funds

With incidental fund-raisings, local leaders or a community group collect voluntary contributions for the construction, repair and expansion of the community water supply. Funds are collected at public meetings, bazaars, lotteries, festivals, and similar social activities, or through door-to-door collections.

The total amount that can be collected in this way is uncertain when the size of the contributions is left to be decided by individual households. Setting a target for the period to be provided for and dividing this target by the estimated number of user households can help. Each household then has a yardstick to set its personal contribution by.

Annual voluntary fund-raising for maintenance can be a good solution in communities with seasonal income. In farming communities for example, a special campaign can be organized to raise money for the running costs of the community water supply at the time when the cash crops have been sold (see Example 3.1). The amount of money that needs to be raised should of course not be too large. An advantage is also the reduction of work for the local organization, as it needs to come into action for fund collection only once a year. This can be done at a time when agricultural work is slackening and traditionally much attention is paid to social activities.

([1]) A complicating factor with communal wells is that they are often used by and seen as belonging to the surrounding neighbourhood instead of the whole community. An alternative is therefore that each village section has its own well fund.

Example 3.1 A village fund-raising

Kidoda village is an agricultural community of 196 households in Southern Kenya. It has a piped gravity system with 4 public taps. In addition there is one hand-pump well. Unlike other villages in the area, Kidoda has no community income to finance the upkeep of the water supply. The costs of upkeep have been calculated to be 4000 shillings per year. A maintenance fund has therefore been set up, to which each family pays a monthly contribution of 2 shillings. Soon, however, payments are in arrears. Stimulation does not work as people say they have no cash and the supply is still working. The water committee thereupon decides to invite all male and female heads of households to a meeting to find another way of financing. The meeting settles for a public fund raising, directly after the harvest. The target for the maintenance fund for the coming year is set and explained by the water committee. Each family decides for itself whether they pay more or less than the average contribution needed. The committee registers the contributions, issues receipts and visits non-paying families. Households known to be poor can also pay the value of their contribution in kind, including labour. In-kind products such as chickens and maize are auctioned at the meeting, so that the water committee can bank all the money in its water account.

A limitation of the system is that there is no link with actual water use. Households which use large quantities of water for domestic and perhaps also productive purposes such as livestock and vegetables may not pay in proportion or may even evade payment completely. The system is therefore only suitable when there is enough social control in the community to ensure that all user households pay a voluntary contribution in accordance to their capacity and benefits received.

3.1.2 General community revenue

In some countries communities jointly own and manage communal enterprises, such as a communal field for a cash crop, a village shop or a flour mill. The profit made on these enterprises, or community funds generated by other means (e.g. levies on crops, cattle sales, or businesses) are used to pay for other community expenditures, such as maintenance and repair of a public standpost system (see Example 3.2).

Example 3.2 A communal enterprise to finance the water supply

People in the Tanzanian village of Mukinzi traditionally collect their water from dug wells. These wells often collapse during the rainy season, when the area gets flooded. The village therefore decides to apply for a piped water supply with local contributions. First, each family contributes a fixed amount in cash and labour for the construction of the intake, storage tank, main pipeline and a central distribution point. Further fund collections are organized for the distribution network and a maintenance fund. However, the people argue that they cannot continue to give substantial cash contributions. In a meeting it is therefore decided that each family cultivates a part of a communal field. The proceeds are put in the water fund. By popular vote it is decided that when the proceeds per acre exceed the needs, the surplus is divided among the participating households. Households not fulfilling their share either pay the rest in cash or cultivate a larger plot in the next season. People in difficult circumstances, such as old couples and women heads of households with small children, are exempted from labour.

This type of financing can be politically acceptable in countries where a national policy of free water means that it is not acceptable to ask individual households to pay for water from public taps. (Water is usually not free for the few house connection owners, who have to pay water rates).

A precondition for this type of financing is that all households have more or less equal access to the improved water supply. Otherwise the less fortunate households will quite rightly object that the service is paid for from funds to which they also contribute.

A disadvantage of relying on general community revenue is that the availability of funds for the water system depends on the income and profits from the other enterprises. These enterprises may fluctuate considerably in their results and also need their own investments. One option is to try and expand the number and variety of sources of community revenue, so that risks are more divided.

There may also be opportunities for the productive use of surplus water from the water supply, for example, for brick-making or horticulture. In general, however, it is not easy to turn such activities into a profit-making enterprise. They need good marketing outlets and demand considerable inputs, e.g. tools, seeds, fertilizer and manpower. Another issue for decision-making is whether it is better to run these enterprises as a communal undertaking or to lease them to an individual or community group for a fixed price or share in profits. Of course domestic users should not suffer from the extra water demands of such activities.

In most of these cases, it will be necessary to assess the amount and reliability of net community income with the local authorities and committees, and compare this amount with the requirements for financing annual costs of the community water supply system in the first year as well as at later stages, when the water supply will need more repairs.

3.1.3 Community revolving funds

Another interesting way to involve the community in the financing of community water supplies is a community-based revolving fund. Starting capital may come from a government donation or the issue of shares to individual households. Often there is an upper limit to the number of shares each household may buy. This prevents wealth accumulating in the hands of a few families, and decision-making becoming dominated by the wealthier fund-members.

Using the initial capital, loans are given to individual households or groups to start small enterprises or improve housing and sanitation. Upon repayment new loans are given to other members, according to the decisions of the group. Repayment of loans plus interest makes it possible to give a greater number of new loans to others. The community may also use the capital to set up communal enterprises, such as a community shop or a workyard producing building blocks,

latrine slabs and other building materials. In this way, community income slowly grows until it becomes possible to finance some basic service. One of these services may be safe water (see Example 3.3). Common characteristics of successful revolving village funds are strong leadership, high village unity, a high level of participation, diversified sources of income, diversified services, compensation for fund managers, external inputs, including technical and organizational training and periodic review and support visits, and good return of investments ([1]).

Example 3.3 A village revolving fund for progressive development.

In Ban Sieo, a small farmers' village in Thailand, live 148 families. Like many other villages in the area, they have organized their own revolving fund. Each family can buy up to ten shares in the fund at a fixed price. From the fund loans are given to individual households and cooperative enterprises. Ban Sieo has established a cooperative village shop. Neighbouring villages have set up a rice mill, a biscuit production centre, a building block industry and a silk weaving cooperative. Twenty per cent of the annual profits made with the fund are added to the fund's capital. The remainder is partly paid out to the shareholders and partly used for village services. Ban Sieo has for example built a public reading room. This helps the villagers to keep up their newly acquired literacy skills. The fund has also been used to give loans to families to build a rainwater storage tank. Poor households receive an interest-free loan. In this way, all households have built at least one tank for safe drinking water in less than 4 months. The village is now considering the construction of a simple piped water supply. The idea is to install one or two communal water points in the first phase. In the second phase, these would be expanded to private household and group connections.

Despite initial scepticism, experience with loan repayment by low-income households is very positive. Women in particular have gained outstanding repayment records in many countries. Contributing

([1]) Menaruchi, A. (1986). Drinking water and sanitation: a village in action. World Health Forum, vol. 7, p.303-306, and PRICOR (1984). Primary health care operations. Interim Report. Chevy Chase, Maryland, USA, Center for Human Sciences.

factors are the intimate knowledge which small communities or neighbourhoods have of their members' capacities and reliability, the creation of group liability and control, and the strong motivation to make life better for the children.

3.1.4 Production cooperatives

Sometimes, an improved water supply is established and run by a group of households rather than a community as a whole. The water supply serves either the group or the whole community. One type of group is a production cooperative. Its members contribute regular payments in cash or kind, or buy shares. The resulting fund is used to finance cooperative enterprises or give loans to individual members.

Once the group has got sufficient revenue, the members frequently decide to use part of their funds to finance basic services for the group, such as a water supply and household latrines. The fund is used to pay all or part of the construction costs, or to establish a maintenance fund for an externally financed system. Because social services to members usually come in a later stage, cooperatives are already well-organized by the time that they start a water supply project. Their earlier experience with social organization and financial management is also good proof of their capacity to administer a small water system.

A limiting factor to a piped water supply for the whole community is that cooperatives function best when they are based on shared economic interests. They usually consist of a group of people who earn their money in the same way. Often, its membership also belongs to the same socio-economic class. Thus, some cooperatives unite wealthy farmers, while others consist of poor farmers, fishermen or small entrepreneurs. In each case, problems may occur over financing water systems that serve other families besides their own group. A piped water supply with house connections financed by a wealthy cooperative does not always provide adequate services to poor non-members. Similarly a community service with public taps built by a workers'

cooperative might be expanded by influential households to include private house connections, although they did not contribute to the installation of the original basic service (see Example 3.4).

Example 3.4 From cooperative system to community water supply

In 1960, a workers' cooperative in Muquiyauyo in Peru participated in building a piped water supply in their community. Public taps were built in all the main streets. Members of the cooperative contributed with money and labour. In 1966, the water supply became a community system. It was expanded to include house connections to those living along the main streets. Many of these house connection owners were not members of the cooperative. Although they had not participated in the earlier construction of the basic system, they paid no labour compensation. On the other hand, many of the cooperative members who had participated earlier lived in side streets. They did not get the same opportunity to take a private connection from the water supply they had helped to build. These factors were a cause of deep disillusionment among this group and raised their consciousness of socio-economic and political conflict.
Source: IRC Technical Paper 17, p.58.

A special form of a cooperative approach to an improved water supply is a savings club. Each member of the club (often a womens' group) makes a small regular contribution to a communal fund. These contributions can be in cash or in kind. In some groups, for example, members save a handful of rice every day. When enough rice has been collected it is sold to increase the funds of the group. The members of the group may also raise funds as a group, e.g. by hiring themselves out for agricultural labour during the peak season. The group's savings are paid out to each member in turn to finance a major acquisition, e.g. a corrugated iron roof with gutter and rainwater collection tank. In this way the women have succeeded in assisting each other to make important improvements for family hygiene and labour reduction. In other cases, the groups have initiated and contributed financially to the improvement of the community water supply, and have also succeeded in mobilizing help from the men ([1]).

([1]) See IRC Technical Paper 22, p.46 and 116.

3.2 Options for regular charges

The alternative to community funds is that user households pay a regular and fixed contribution for the special purpose of financing the water system. Payments are made to the water agency, the local government or a water users' organization.

The advantages of regular and direct water charges are that they can be more easily related to actual water use and to the operation and maintenance costs of an improved community water supply. For charging a choice has to be made between general payment of **flat water rates** (3.2.1), **graded rates** (3.2.2), a combination of paid private and free public taps, the so-called **mixed system** (3.2.3) or rates based on **watermetering** (3.2.4). A summary of the main characteristics of each option is given in Table 2.

Table 2: Options for regular charges

Type	Setting	Purpose	Organization	Methods
Unmetered taps, flat rates	families have private taps, or share taps with well-defined social group, have fairly reliable incomes, and benefit more or less equally	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water committee or sub-committee, board of water users' cooperative, local government, tap users' committee	project agency advises on initial rate for approval by users; rates are collected and administered by the local water organization
Unmetered taps, graded rates	in communities with appreciable differences in water use and benefits and sufficient community spirit to divide user households into different payment categories	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	community water organization with support from promoters or other social experts assisting the project agency	private tap owners are classified in high and low rate categories using local indicators of water use and wealth; users sharing taps may pay cheaper or equivalent individual rates, which may be flat or graded
Mixed systems (paid private taps, free standposts)	in communities with large differences in payment capacity and water use, with high and low-income households living in separate groups or neighbourhoods	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water agency with community water committee or sub-committee	surpluses on private taps are used to finance the costs of free public taps in poorer sections
Water-metering	in large communities with limited water resources and an efficient administration	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water agency	meter reading, billing and rate collection by separate workers, or user payments through banks, at central office or local branch offices

3.2.1 Unmetered taps with flat rates

In a flat rate system, each user household pays a fixed amount of money, regardless of the volume of water used. In its simplest form, the total amount of money needed for the upkeep of the improved water system is divided equally over the number of households using the water. Payment may be per month, per season, or per year. This should depend on when it is most convenient for the people to pay (see Example 3.5).

Example 3.5 Flat rates: monthly, annual or both?

In a community with 500 households it is calculated that 30,000 shillings are needed per year for the upkeep of the water supply system. Because all households have the same service level (i.e. type of water supply and distance from it) and income differences are not very great, the community decides that every household will pay an equal amount of money, or 30,000 - 500 = 60 shillings per year. However, there is considerable disagreement about the time of payment.
Farmers in the community prefer to pay this amount in one or two big installments after the harvest of their crops. The few farmworkers also prefer to pay in bigger installments, but after both harvesting and planting when they are earning most. Small business people on the other hand prefer to pay in small installments every month. Although the committee recognizes the value of flexible payment, it fears that too much flexibility will result in a lower payment discipline and higher administrative costs. A meeting is therefore called to discuss this issue. It is decided that the monthly payments will remain possible, but that those who want to pay ahead when this is most convenient to them can do so. In exchange they will get a small discount on their water rates.

Flat rates are easiest to organize with private taps or group connections. In these cases it is clear who are users and who are not. They should also be limited to situations where benefits are more or less equal. Individual households which for whatever reason make much more use of water should be charged proportionally. This is discussed in detail in section 3.2.2. With public standposts, families who live at further distance or have their own water source may particularly object to paying the same amount of money as those who live close to a tap.

One possible solution to distinguish between regular and occasional users is to form a tap committee at every public tap to collect water rates for the overall water administration. These committees can advise or decide on which households are regular users and should pay a full flat rate; which households should get a lower rate because of greater distance to and periodic use of the taps, and which households should not be charged at all. They can also consult the user households directly and discuss the importance of reliable and safe water with them, even when this means walking a somewhat greater distance to get it.

An alternative to free public taps and private house connections is the introduction of paid group connections. This is particularly suitable where strong social ties already exist within small groups living close together. Often, for example, groups of low-income households already share and care for traditional water sources. Sharing a yard connection or standpost with a small group of neighbours can be a good alternative when a private connection is too expensive.

Payment of flat rates for these group connections means that the households who are members of the group all pay an equal part of the overall charge for a group connection. In case the system also contains private house connections, the same flat rate would be charged for house or group connections. Thus, four households sharing a single tap would each pay a quarter of the rate paid by households with a private tap.

In this system it is assumed that the total water use of the four families will not differ substantially from that of a single household. Underlying arguments are that on the one hand, a single household with a private tap will use as much water as a small group of households because of the greater convenience of private taps, more amenities such as bathrooms and flush-toilets and a higher income. If on the other hand, the water use of the group is slightly larger, larger use at an equal (but preferably cost-covering) rate can be seen as a trade-off against reduced convenience. However, in cases where large volumes of water are used in group connections, it may be

advisable to base agreements with the groups on the use of a graded group charge. This option is discussed in the next section.

3.2.2 Unmetered taps with graded rates

A major disadvantage of flat rates is that they press more heavily on low-income households than on the better-off, even though the latter often use relatively more water than the former. As a first step to a fairer rate system some communities have made some categories of households exempt from rate payments. In a piped water supply project in Indonesia, for example, the poorest 19 households of a total of 640 user-families did not have to pay water rates. Other communities have exempted old couples and households consisting of single women with young children from contributions in either cash or kind.

Another option is to introduce graded rates. For this type of rate taps are not metered, but user households are classified into two or three rate categories. These categories are based on estimated differences in water use and income (e.g. high, medium, low). The advantage of graded user rates is that they take a rough account of volume used and payment capacity, without having to go to the expense of installing and reading water meters. Especially in areas with considerable differences in income and in water use related to these income levels, water authorities could try to develop graded rather than flat rates. Such rates have for example been introduced in several communities in Colombia. The user households have been grouped with the help of the promoter of the water agency. The water rates for each group have subsequently been calculated in a users' assembly, and accepted by public vote (see Example 3.6).

The introduction of graded rates is easiest when clear and valid indicators of water use and income level can be found. This will of course depend on local circumstances. For example, in some areas size of land-holding is a good indicator of income. In other areas the productivity of the land varies too much for this, and the quality of housing is used instead. An alternative to working out graded rates through assessments and dialogue in individual communities is to ask a

social scientist to develop a system of valid, easy-to-measure and acceptable indicators of household income and volume of water use for the area concerned. The applicability of this system can then be tried out on a small scale ([1]).

Example 3.6 Different rates for different user groups

When the piped water system in Sibundoy, an agricultural community in Southern Colombia, was taken over and expanded by another water authority, a flat rate of 28 pesos was proposed. This was unacceptable to the large poorer section of the community. Originally, the indigeneous small farmers paid a monthly rate of 23 pesos. Agricultural settlers paid between 33 and 38 pesos per month. The water agency then proposed an evaluation of the socio-economic status of each household. Existing data (the government property tax) were supplemented through home visits by the promoter. He looked at type of housing, household assets, size and type of farm etc. In a general assembly the users agreed on a division into four categories of wealth and water use: low, low-to-medium, medium-to-high and high. The estimated recurrent costs of the scheme were calculated. Taking into account the number of households in each category the actual rates agreed upon were 23, 38, 63 and 90 pesos per month. Source: IRC Occasional Paper 19, p.11.

Another way of charging graded water rates is to raise a levy on cash crops. This is most feasible in communities where these crops are marketed through a cooperative or a single-commodity marketing board, and the water supply is cooperatively or community-owned ([2]). Collecting fees in kind in this way has the additional advantage of including an element of automatic indexation (revenue is linked to rising costs).

A special case of inequity caused by flat rates may occur when both men and women are asked to contribute the same amount to the community water system ([3]). There are cultures where men and women each have their own separate sources of income and financial responsibilities. The income of the women comes from selling surpluses of their food

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([1]) See, for example, the system worked out by an anthropologist for piped water supplies in north and south-west Cameroon mentioned in IRC Technical Paper 12, p.108.

([2]) See IRC Technical Paper 17, p.57.

([3]) Chimuka, M.K., Kabumu, D.M. and Kamalata, K.L. (1986). First project review PSWS/PSSC project in Zambia. Lusaka, Zambia, Department of Water Affairs; Lusaka, Zambia, Department of Social Development; Lusaka, Zambia, Ministry of Health, p.12.

crops, that of the men from selling cash crops. Women's incomes are therefore usually smaller than those of men. Thus, a fixed contribution to the water supply means in practice that the women contribute a much greater proportion of their income to the community water system than the men.

Graded rates and group connections

For group connections, a distinction can be made between graded rates for the group connections as such, and graded rates for members, but a fixed rate for the group as a whole. In the first case, the water administration charges different rates for group connections and private taps. Rates for the group connections may either be lower or higher than the rates of private taps. An example of a higher rate is that of a group connection shared by a minimum of 4 households at an individual household rate of 4 shillings. As a total the group would thus raise a minimum of 16 shillings. At the same time, a house connection owner might have to pay 10 shillings for the greater convenience of his private tap. In this way, sharing households pay a lower, and flat individual rate, but at the same time compensate the agency for their greater use of water as a group.

A higher private rate (e.g. 20 shillings) than the total water rate for a shared tap (e.g. 16 shillings) may be acceptable when private tap owners use large quantities of water in comparison with families who share a tap. The private tap owners may for instance also have installed washing and bathing facilities inside their house.

Flat rates for individual members within the groups have the same disadvantages as flat rates for house or yard connections. In addition, they are often a source of conflict between group members, since the members directly observe and experience differences in water use within the group.

Tap users' groups in low income urban areas in Malawi for instance had difficulty in functioning and stopped paying their water bills when conflicts occurred about water use. Members using the water only for domestic uses objected to others using the water for business

purposes as well. Another issue to be resolved was the payment of a single charge by extended families, e.g. married children living with their parents or husbands with several wives. Also, poor households were using less water than the average agreed upon (6 buckets per household per day), because they had few containers.

Water agencies can stimulate groups to solve such problems by formulating a clear policy on equitable rates. They can also assist groups in decision-making on user rate systems and develop simple guidelines for graded water rates. The groups themselved often have sufficient knowledge about their members to make well-reasoned decisions about who should fall in which rate category. A new system being considered in Malawi for example is to advise the tap users' groups to introduce two or three flat rates instead of one and classify their members in the different categories according to their water use and capacity to pay. The project will also advise the groups to count married children or second wives with children as a separate household, but to charge no higher rate when single families have more than the average number of children. Implementation will be part of special training seminars for the groups, the tap committees and the water councils at district level to which the groups can turn in case of serious internal conflicts ([1]).

Productive use of water by individual households

A system of graded water rates also makes it possible to charge for productive use of domestic water by individual households. Especially when benefits are substantial, there are strong reasons to charge a higher water rate from such households. Firstly, the more wealthy households often have more opportunities for productive uses: they have more cattle, land and so on than poorer households. If they use more water to make more money, it is only fair that they also should pay more for this water use (see Example 3.7). Secondly, there will be extra revenue for maintenance and repairs, and for expansion when water use increases beyond the capacity of the original scheme.

([1]) Personal communication, F. Kwaule, Manager PSWS Project.

Combination of domestic and productive uses of water has several benefits. Firstly, water for vegetable gardens or cattle can fit in with traditional water uses and local needs. It can also motivate households to take a house connection. The income from these productive uses can help to pay water rates. Motivation to maintain and repair the supply is higher, because breakdowns are not only inconvenient and a threat to health, but may also affect family income.

Example 3.7 Flat water rates and the inequity effect

The Banyudisi piped water supply in Java, Indonesia serves 640 families in 11 hamlets. Water is delivered by public standposts with adjoining cubicles for washing and bathing. All households pay a flat monthly rate of Rp. 50. Households which fill up a storage tank within their house pay another Rp. 50. Water is used both for domestic and productive purposes. The commonest productive use is for livestock. A study of 81 households showed that most households with livestock belong to the high and medium income groups. The households with a high income together use nearly 4 times as much water for their livestock as the households in the lowest income group. Yet all pay the same flat rate.
Source: Williams, G. and Sirait, D. (1981). Banyudisi village water supply: a case study of project implementation and utilization in rural Indonesia. Journal of Tropical Medicine and Hygiene, 84, 141-146.

The planning of an improved drinking water supply without consultation of the various user categories on their water needs has often resulted in supplies designed exclusively for domestic purposes. Failure to design domestic water supplies for desired economic uses has resulted in illegal use, water contamination, and shortage of water at peak hours and at the end of distribution networks. Serious problems have led to "vandalism" and conflicts. In conflicts between different user groups, those with economic economic interest usually stand stronger than the women who collect water for

domestic purposes and the health of their families ([1]).

To get revenue from productive uses, projects have to be planned with such uses in mind (see Example 3.8). Where income-generating water use is already present, project design can be adapted to make full use of its potential. It can be discussed with those concerned how the extra costs for these purposes (increased pumping needs, larger diameter pipes, cattle watering troughs etc.) will be financed.

Example 3.8 Productive water use to pay the recurrent costs

Pacul is one of the many communities in Guatemala in which a small piped water supply has been built. The projects start after a community request and a technical and socio-economical feasibility study. The community pays on average 40% of the construction costs in labour, local materials and loan installments. After completion, the schemes are operated, maintained and managed by a local water committee. The community learns all this during the planning. Men and women also participate in siting the private or shared taps. In Pacul, construction was completed in little over one month. One and a half years later the system was still functioning without problems. But meanwhile, the community had built a second piped gravity system. Its water serves to grow strawberries for the urban market. With the extra income the committee hopes to pay off the two loans ahead of schedule and maintain both water supplies. Had the water agency realized this potential and designed a piped system for combined use, the construction costs would have been much lower.
Source: Cox, S. and Annis, S. (1982). Community participation in rural water supply. Grassroots Development, 6, 3-6.

Elsewhere it may be possible to stimulate new productive uses of surplus water. Experience shows that such use does not follow automatically when taps are installed.

([1]) An example is the use of domestic water supplies for cattle watering in areas with water shortages or where traditional sources have a high salinity or fluoride content. Depending on technical feasibility and people's attitudes it could be considered to adapt domestic water supplies to be used for cattle as well, or to develop separate water supplies for humans and animals. In either case, the direct beneficiaries should be asked to participate in the financing of extra costs. They should also be involved in design and management of the cattle watering facilities themselves, to ensure that these are used by all and unhygienic conditions at waterpoints are prevented.

Productive use should of course be both possible and profitable. The water resources should be available, and the needs of communities and user groups taken into account. Careful assessment is also needed whether the additional demands on design and management are within the community's financial and administrative ability. The expanded use should not create new health risks or competition with other communities for the same water source. Further, the necessary inputs such as land, credit, labour and marketing facilities should be present, as well as a sufficiently large and reliable market for selling the products.

Participation of local women in the planning and implementation of productive uses of water is important for two reasons. Firstly, many income-generating activities related to water are carried out by the women of the household. Secondly, women use income over which they have a say primarily for basic family needs, including the payment of water rates. Thus, in a project in Thailand, women used the increased availability of water and time for income-raising activities in order to pay for the household's water connection ([1]).

3.2.3 Mixed systems

Another option to cover the recurrent costs of a community water scheme is to combine paid private connections with free public standposts, the so-called mixed system. When there are enough private connections it becomes possible to finance the cost of public taps for the lowest income groups from a surplus of the rates paid by the private users. However, it is not always easy to get a good balance between free public taps and paid private connections. Households which can afford to take a house connection do not always do so, when there are enough free standposts. Reduction of the number of standposts can stimulate more wealthy households to take paid house connections. However, it also reduces the access to a minimum service for those who cannot afford a private tap.

([1]) See IRC Technical Paper 22, p.50, 102 and 167.

Sometimes it is possible to raise the number of paid connections in other ways. One such way is the education of better-to-do households on the advantages of a private tap in terms of family health and more time for children's school education, women's classes, child care, production of family food etc. An increased awareness of the multiple benefits of good water in the home can in particular stimulate male support for private house connections.

In some communities where houses of low and high-income families are not mixed or too close together, it may also be possible to limit free public standposts to the poorer neighbourhoods. The wealthier sections must then be helped to understand why, for reasons of public welfare, only private connections are made available to them. This can be combined with the promotional activities mentioned above, to avoid the wealthier sections feeling discriminated against by not getting free standposts.

3.2.4 Metered taps

While graded rates based on social judgements or indicators have the advantage that they avoid the introduction of more complex metered connections, water meters do enable the agency to charge according to actual volumes used. However, metering raises considerably the costs of the water system. On the other hand, if properly enforced, meters induce users to avoid water wastage, which will reduce long-term costs. Metering is therefore often introduced in larger communities where water is scarce, or is becoming so, and new sources are expensive to develop.

Individual household meters are not only expensive to install, they also need to be read regularly and make the administration more complex. Separate staff to read meters, write bills and accept payments reduces chances of fraud, but also increases the cost to the users. Mailing the bills is an additional safeguard, but is less feasible in areas where few people have post boxes. Payment in person at a distant central office which is open only during office hours is

often also difficult for the users and alternatives may be necessary. Metering therefore places high demands on the administrative capacities of the managing water organization. It has happened that the costs of billing and collection alone surpasses the total amount of money collected ([1]). In addition, both meters with billing, and their alternative, coin-operated meters, are sometimes tampered with to reduce payments. Meters are also subject to technical problems. For small community water supplies, unmetered systems are therefore to be preferred initially. An exception is peri-urban group connections, as discussed below under metered group connections.

With metered house connections different types of water charges are possible. Flat rates mean that every meter holder pays the same amount per unit quantity of water consumed, irrespective of whether the household is a small or a large user.

With a progressive rate, the amounts of water consumed are divided into blocks. The price charged for the first block of, for example, 18 cubic metres per month, is kept low, because this water is used for basic family and health needs, such as drinking, cooking, bathing, washing and cleaning.

For subsequent blocks of water use, a progressively higher rate is charged, because this water is used for amenities such as flush toilets and watering of lawns, or for productive purposes. If necessary, profits made on these higher rate blocks are used to subsidize the price of water used for basic needs. This is a further example of cross subsidy.

Metered group connections

Regular user payments are more easily obtained for private taps than for public standposts. Two possible financing solutions for

([1]) A study in Botswana found that when revenue was collected at all, collection costs took all or most of the proceeds. See IRC Technical Paper 12, p.146.

standposts, mixed systems whereby free standposts are cross-subsidized by paid house connections, and unmetered group connections with flat or graded rates have already been discussed. A third option is the installation of metered group connections. This is especially suitable in urban areas when the usual metered house connections are too expensive for low-income households, and unmetered group connections are not viable because the population is frequently moving, so strong social ties and control do not develop. The system described here is the one used in the Malawi communal water point schemes (1).

To be connected, 20 to 30 families together form a tap-users' group. They consent to pay jointly an agreed monthly rate for the water from their communal tap. For this amount they get a specified volume of water. Calculations of the monthly volume are based on the average amount of water used by a typical household in the area. In Malawi this is 6 buckets of water per day for a household of 4 to 6 persons (see Example 3.9).

Example 3.9 A metered group connection with flat user rates

For 25 Kwacha the group chaired by Mrs. X gets 90 cubic metres of water per month from their communal tap. With 25 members, each household pays 1 Kwacha every month. For this money they can collect up to 6 buckets of water per day. This means 30 litres of water per person for a family of four, and 20 litres per person for a family of six. The group can also sign an agreement for a higher or lower volume of water. The amount that the group has to pay depends on the number of buckets of water per household per day that the group prefers to get as reflected in the monthly meter reading.
Source: Malawi, Republic of (1982). Considerations and proposal on the management of community water points. Lilongwe, Malawi, Department of Lands, Valuation and Water, Water Supply Branch.

(1) As developed in the Malawi Government Urban Communal Water Point Project, UNDP/UNCDF/WHO-assisted. See Carrié, R. (1985). Manual for planning, investigation, design, construction and monitoring of Communal Water Point Projects. Volumes I and II. Lilongwe, Malawi, Ministry of Works and Supplies, Water Department and UNDP and WHO Regional Office for Africa.

The actual volume used by the group is metered at the tap. The meter is read every month by the agency-paid operator of the scheme. The operator prepares the bill directly after reading the meter and hands it to the chairperson of the users' group. Payments are made to government cashiers in the area. The group can choose between paying the exact bill or paying the amount originally agreed upon. In the latter case any extra money which they pay in months of limited use, that is in the rainy season, stays in their account to pay for the higher bills during the dry season. When the group continues to use more (or less) water than originally assumed, the agreed group contribution can be revised.

The indication of the average number of buckets per household per day makes it easier for the users to picture what they will get for their money. It also helps the group to control excessive use by some of its members. To prevent use by outsiders, each group has a key to lock up the valve box during the hours of non-use.

To pay the water bill, users' groups have a choice of three types of rate systems: a flat rate for every member household, regardless of household size or composition; a graded rate based on family size; and a graded rate based on the household's intended level of consumption. Orginally, most groups in Malawi chose the flat rate, but the present tendency is towards differential rates for member households ([1]).

Connection charge

A major constraint to user participation especially in piped systems with metered connections (but also some unmetered connections) is the often high connection fee which water agencies charge to individual households wishing to install a private tap. Piped water supply programmes in several in South American countries and in the

([1]) Kwaule, Fabiano (1985). PSWS project pilot observation and monitoring findings. Lilongwe, Malawi, Ministry of Works and Supplies, Department of Water, p.4-5, p.13-14 and 17; and Malawi, Republic of (1986). Public standpost water supplies project, Malawi. Preliminary field report. Lilongwe, Malawi, Ministry of Works and Supplies, Department of Water.

Philippines facilitate private connections by giving connection loans and enabling households to pay back all or most of the connection charge as part of their monthly water rates.

Another method frequently used in rural and low-income urban areas, especially in Central and South America is to give users the opportunity to do all the unskilled construction work by themselves. In compensation they get their connection free of charge, or get the value of their work deducted from the total construction costs (see Example 3.10).

Example 3.10 Financing of connection fees to a piped water system

The people of Salto de Bordones, a community in the Andean highlands of Colombia have come together in a general assembly to discuss the financing of a piped gravity water supply in their community. The total estimated cost of the proposed system is nearly 7 million pesos. Because of the relatively high construction costs, the community is asked to contribute 98,000 pesos, or 1.4% in cash. Since there are 125 participating households, each household makes a down payment of 784 pesos. The estimated value of contribution in kind by the users amounts to over 850,000 pesos in labour and 70,000 pesos in local materials. This brings the direct community contribution to the construction costs at a little over 1 million pesos. The remainder, almost 6 million pesos, is financed by a loan to the community covering 35% of this amount plus interest, and a grant for the remainder from the government and various donors. Loan repayment plus the costs of chlorination, part-time operator, maintenance, transport, spares, and office will bring the monthly household rates to 218 pesos a month.

Source: IRC (1981). Report on the Slow Sand Filtration Demonstration Projects in Colombia, p.10

New residents and those that have not joined initially frequently have to pay an amount equal to the value of the voluntary labour performed and materials donated during the initial construction period. This practice means that new members have to pay a relatively high sum in cash to the local water users' association before they can be connected to the water system. It might therefore be considered to give those who cannot easily afford these charges the same opportunity of contributing free labour and local materials instead of paying the full connection charge, but now as part of operation and maintenance work (1).

(1) E.g. collection of rates, checking for leaks, washing sand of slow sand filters etc.

3.3 Water vending

As mentioned before, partial or full recovery of costs for piped water supplies is hardest for public standposts. Water agencies have therefore also resorted to formal water vending systems for on-the-spot collection of revenue. Options are the establishment of vending points as part of the water distribution network; or, instead of having a piped distribution system at all, selling safe water by water trucks, official vendors or carriers. For the first of these options, vending points as part of a water distribution system, the alternatives are: water kiosks, concession sales and coin-operated taps.

At **water kiosks** the water is sold to the users per litre or type of container. Operators are either employed by the agency or are licence holders to whom the kiosk is rented. Advantages of kiosks over public taps are that water wastage, vandalism and unhygienic conditions around the tap can be minimized and that user payment is assured. Kiosk holders may also be responsible for making small repairs, such as replacement of washers and repairs to platforms and kiosk buildings. Vending also accustoms users to payment, so that group or house connections become more attractive, especially because they offer better services at an often lower price.

However, the system usually means much higher costs to the users than yard or group connections, and the users are vulnerable to exploitation in times of water shortage. The users pay not only for the water, but they also pay the salary or profit of the vendors. In fact the greater part of the price paid may be for the work of the vendor, and not the water itself ([1]). In the best case, the agency sells bulk water at a low price to licence holders and stipulates that the price charged per cubic metre is not higher than the one charged in the lowest-rate group of private taps. Nevertheless, the users get a lower level of service for this price than they would get from

([1]) For case studies on the costs of vending over private taps, see Example 3.11 and 3.13.

private taps or group connections. Also, the kiosks are often limited in number and spread out thinly to ensure sufficient earnings for each vending point. This can result in long waiting times at peak hours and continued use of contaminated alternative sources. Users are also inconvenienced when taps are locked up at night, or when the licence-holder is absent. In general therefore, kiosks are a less satisfactory solution than other systems of cost-recovery.

With **concession sales,** owners of a house connection get the right to sell water from a metered tap at their home to other households in their neighbourhood who do not have a private connection. As a result poor users may pay more per litre for a lower level of service than the higher income households. In addition these concessions may be taken on by local businessmen who already have a considerable income from other interests. If vending by concession holders is preferred over mixed systems or group connections, the agency should therefore at least consider giving the right of sale to persons who need the additional income, such as women heads of households.

The advantages of choosing such women as concession holders are several. They are home-bound, so that chances of their absence during the day or evening are lower. Because of limited job alternatives, it is also less likely that there will be problems of a high turnover or double jobs, to reduce the quality of the service. For the same reason such women are motivated to do a good job, while the income goes to the person who does the actual work. Finally, female concession holders can communicate easier with other women on the health aspects of safe water collection, storage and use, when given some training in this subject. Their involvement therefore appears to be worth trying in cases where concession sales are planned or in existance.

Some agencies have installed **coin-operated** taps to reduce water wastage and increase cost recovery from public standposts. However,

current experiences are not positive because such devices are very sensitive to breakdowns and interference with the operating mechanisms. This solution is therefore not recommended.

Where for various reasons, a piped water supply or alternative new water supply system is not possible, agencies can also develop the water source alone, or use an existing safe water supply, and have this water delivered to more remote users by means of an **improved water carrying system.** The best known, but relatively expensive example is delivery by water trucks. Another alternative is improved water carrying by vendors and carriers. It has been calculated that providing water of a controlled quality in a hygienic way (specially designed vehicles, hygienic water containers), and at a fixed price, is in some cases cheaper than installing a distribution system with house connections, although it is of course a lower level of service. However, as far as is known this system has not been tested in practice. Also, the analysis of a potential case shows that both the capital and recurrent costs of public standposts would in any case be lower than improved vending (see Example 3.11).

Example 3.11 Improved vending through concession sales

The urban neighbourhood chosen for analysis is situated in Surabaya, the second largest city in Indonesia. The area studied has a population of 5000 living on 16 hectares. About 45% of the residents purchase their water from existing vendors. The price per m^3 is equal to about US $ 3.00. Municipal water pipes are 1000 m apart, framing the neighbourhood but service pipes do not run into the area, and none of the households have piped water at present. Both standpost and household taps would require the installation of secondary piping. However, an improved vending system would consist of a number of house connections near the mains which would serve as vending stations. One household member would serve as vendor, storing water in storage tanks and distributing water to carriers who would pull containers in carts along the streets. The cost of improved vending was compared to that of the piped systems. The results as summarised in the following table show that both capital and recurrent costs of standposts are lower than improved vending. However the vending system can compete with house connections, as far as costs are concerned, but without the benefits of the

unrestricted quantities and 24-hour service of a house connection. The cost per m^3 would be equal to about US $ 0.80/m^3.

	Capital costs (US $)	Present Value Costs *) (US $)
Standposts	34,000	45,000
Improved vending	59,000	200,000
House connections	170,000	240,000

*) Evaluated over 10 yrs at 10% interest

Source: Zaroff, Barbara and Daniel A. Okun, (1984). Water vending in developing countries, Aqua, 5, p.293.

Another alternative to a piped supply would be to improve an already existing vending system instead of establishing a new one. In considering this option, the character of the vending system should be investigated as part of the initial appraisal. Are for example the carriers self-employed? Are they poor or can they afford investments in an improved and licensed vending system? When they employ others to do the actual work, are labour conditions and payment reasonable? Are users exploited or does competition keep the prices down? Do middlemen take extraordinary profits, or does the system provide a sufficient living for people who have few other employment opportunities? What are the needs and opportunities for strengthening the position of individual water carriers from low-income households, e.g. by providing loans for appropriate water carts or by forming a water vending cooperative? In some places such cooperatives appear to be functioning already, such as the People's Fund of Cissin in Burkina Faso. The water carts are managed on a cooperative basis by the fund. There appears also to be some control on the quality of the water. However, case studies on the cost-effectiveness of such systems in comparison with other types of water supply do not yet seem to exist.

Another possibility for water agencies is to use **community-based distribution systems.** This is especially so in urban areas where water can be sold in bulk to community organizations in low-income areas, who thereafter distribute it independently to the individual households in their area. In this way, low income neighbourhoods are served which otherwise tend to be passed over as cities grow and the

capacity of water agencies to cope with new extensions to the network is stretched. One such case is presented in Example 3.12 where a users' cooperative rather than commercial kiosk keepers is operating two water vending points in an area which is technically unsuitable for a larger piped system. A similar system has been reported for several towns in Kenya, where women's groups thus avoid exploitation by unscrupulous water sellers in times of water shortage.

Example 3.12 A users' cooperative managing paid standposts

For the women in Villa de los Laureles, a low-income urban neighbourhood in the capital of Honduras, water comes from the river or a traditional water vendor. In the dry season, this water may cost as much as 50 cents per 10 litre. The women of the neighbourhood have therefore formed a water cooperative. The cooperative buys water in bulk from the municipality. It sells it to the users at two kiosks in their neighbourhood. Every three months, two other women heads of households become the kiosk operators, apparently to divide the benefits of employment among several poor women. The operators control the tap and sell the water at a fixed price of 10 cents per 10 litres. Total revenue covers the water bill and the salary of the operators. Problems with water pressure in the area are solved by selling water at the lower-lying kiosk in the morning and at the higher situated kiosk in the afternoon.
Source: Elmendorf, M. and Kruiderink, A. (1983). Promotion and support for women's participation in the IDWSSD. Report on mission to Honduras. New York, USA, UNDP, Project INT/83/003.

In another case of urban vending, the supply is managed by an elected community water committee (Example 3.13). Here vending at communal water points was chosen because social organization and community spirit were thought to be too low for other solutions that would be as cost-effective to the agency whilst providing an equal service at a lower price to the users.

Example 3.13 Paid standposts in two peri-urban communities

Embo-Nqcolosi and Emolwezi are peri-urban communities with dense, unstructured and informal housing. Their inhabitants come from different rural areas and belong to different ethnic groups. There is little social cohesion and organization. Most people work in the formal sector of the nearby city. A development policy for the area is lacking. Water sources are few and far between, and are heavily

polluted. A four year drought and typhoid epidemic made the situation worse. With the help of a non-governmental organization of concerned urban residents, a study was therefore made for an improved water supply. Its results were discussed with the water committees in both communities. Tap water extended from the nearest urban main was the most cost-effective and socially acceptable solution. Because of the low social cohesiveness of the area, the type of distribution chosen is public taps with local operators paid by the water committees. Users purchase plastic tokens valid for one unit of water (25 litres) in shops near the taps. The price per token is three times the price paid by the committee for one unit of bulk water. The profit is used to pay the operators and the committee secretaries who do all administrative work (26% - 33% of the generated revenue); to finance the maintenance of the pipe and taps (3% - 11%); to pay back the construction loan (7%) and to expand the supply (with 3 standpipes at present).
Advantages are: a well-functioning water supply (over the last three and a half years it has been operational for 99.9% of the time during 7 days a week); a permanent job for 20 community members; a water price which is 3 to 7 times lower than that charged by traditional water sellers; payment according to volume used; and strengthening of community capacity for self-reliant development.
Disadvantages are: half of the population in the area do not yet have easy access to safe water; no change in policy on basic services for people who with their cheap labour greatly support the urban economy, and water prices which are still three times the normal municipal tariff.
Source: Rivett-Carnac, J.L. (1984). Community water supplies for peri-urban areas. (MSc Thesis). Capetown, South Africa, University of Capetown, Department of Civil Engineering.

Committee-managed water vending is also the main form of supplying drinking water to low-income urban-fringe areas in Ouagadougou, the capital of Burkina Faso in West Africa (Example 3.14). A first investigation indicates a good cost-recovery of this system, but does not disclose how the sales are managed and whether profits are used to improve the service, or for other community developments.

Such cases are reported to exist in several low-income neighbourhoods in Latin America. United by the problems with their water supply and the initially uncertain status of their settlement, these neighbourhoods have formed their own residents' associations.

These associations buy their water from the water agency at a metered point at the entrance of their neighbourhood and distribute it to the users through a piped distribution network built with their own financing and voluntary labour and managed by the association. Supply to households is presumably through household and group connections, for better-off and poorest households respectively. However, as far as known these cases have not yet been analyzed and documented ([1]).

Example 3.14 Community-based retailing

Over 250 waterpoints (standposts, handpumps and small autonomous water supplies) are managed by committees in urban fringe areas of Ouagadougou, Burkina Faso. For the standposts, the urban water agency charges a bulk price equal to the lowest urban block (F.CFA 95/m^3). Users of standposts and handpumps may be charged a fixed price of 150 F.CFA/m^3 for drums and vending carts and 125 F.CFA/m^3 for buckets and basins. Users of autonomous neighbourhood systems may be charged a maximum of 250 F.CFA/m^3, of which the cost price, or 51 F.CFA/m^3 is reclaimed by the water agency. The differentials from both standposts and autonomous neighbourhood systems may be used by the committees for community investments after having covered the costs of operation, maintenance and depreciation. A first evaluation of three water points indicates a considerable average monthly profit.
Source: Bedek, P., Morel a l'Huissier (1987). L'eau pour tous dans les villes africaines: innovations a Ouagadougou. Cergene, Ecole Nationale des Ponts et Chaussées.

Summarizing, it can be concluded that the option of vending appears to be most appropriate under specific circumstances. Thus, establishment of a vending system instead or before introducing a piped water supply to individual households and groups is indicated when:

- a traditional and socially valuable vending system already exists which can be improved at lower costs (especially recurrent costs)

([1]) Personal communication A.T. White, University of Liverpool, Department of Sociology.

than needed for a piped system. The improved vending system should provide a better quality water to the consumers for a price which is not higher than that of public and private connections. At the same time it should preserve the income of the actual carriers.

- a piped water supply or other appropriate water development is impossible for economic or technical reasons. This is for example the case in urban areas where low-income neighbourhoods are situated on steep slopes above the main city. When the overall demand in the municipal system is great, a network of standposts in these neighbourhoods would be dry during most of the day. Expanding the capacity of the scheme usually demands investments which are not easy to recover. Another alternative, serving each part of the city in turn for limited periods, is not always feasible, or desirable from a public health point of view.
- a piped water supply is ruled out by political authorites, for example, in unauthorized settlements. Agency or cooperative kiosks may be more acceptable because they are less permanent, generate income and reduce public health risks.

In other cases, water agencies can make good use of the stimulus that inadequate water and sanitation conditions have on community mobilization and organization in unserved squatter or semi-legal communities. Together, agency and community can work out socio-economically and technically viable solutions in which the community is involved to an extent which matches its degree of unity and organization (1).

3.4 Indirect taxation

Sometimes municipalities collect the necessary funds for the maintenance of their piped water supply not through direct charges but through indirect taxation. Taxes used most commonly are property or housing taxes. This tax either finances the water service to the plots

(1) For a more detailed discussion of community characteristics and more cases of community involvement in urban projects, see IRC Technical Paper 12, p.17-18, Technical Paper 17, p.121-126 and Technical Paper 22, p.48-49 and 74-75.

or standposts concerned as well as other community services, or has added to it a special surcharge for water. In this way only one collection system is needed, which is easier and saves administrative costs. For the same reason other municipalities combine water rates with electricity charges.

The system is simplest when within each housing area all households have the same service levels and the same organization manages both funds and water services. This is for example the case in some site-and-service schemes. Every household in these schemes has a standard size plot with a latrine or a wet core. For water, more expensive housing areas have their own yard connection. Holders of lower-cost plots share a tap with several neighbours. A part of the property tax paid by the households goes toward the running costs of the water supply.

Administration is more complex when there is a mixture of service levels, from public taps to unmetered multiple house connections. One option is that the different types of households get a different surcharge for water. The water agency subsequently informs the rate collecting agency about every change in service level.

Another is that a general tax is raised, based on the size of the property and the quality of the housing. Large users will thus pay more, because better housing is associated with higher water use and higher income. The advantage of this is that there is no longer a need to keep track of actual service levels and changes.

The advantage for the water authorities that others collect the charges should be set against the need for the transfer of funds from the collecting agency to the water organization. The ultimate amount received frequently does not keep pace with the demands of the water administration. Their costs are apt to increase with inflation and the ageing of the system. In addition, the government institution deciding on the distribution of revenues sometimes reduces its allocation to the water authorities because more pressing obligations have to be met. The users then naturally get frustrated because they are paying taxes for a deteriorating service. In its turn, the water agency gets frustrated because it can do nothing about it.

Some water authorities have installed water meters to register the volume of the water supplied. This enables them to strengthen their claims for transfer of funds by the revenue collecting agency. Others demand an advance payment from the municipal authorities, so that at the end of the year only the surplus delivered still has to be paid. So far, neither measure appears to be fully effective.

Other disadvantages of indirect charges are that they do not inform the users about the real costs of the system nor allow them to participate in decision making and maintenance ([1]).

All things considered, indirect taxation as a means for cost-recovery to maintain and expand community water supplies seems to be most suitable when a specialized agency is in charge of both tax raising and water administration. In other cases, it is in general better to have separate financing for the water supply. This makes it easier for the administrating organization to control both income and expenditure and run a reliable and financially healthy service.

([1]) In Ecuador, all 131 rural water supply systems managed by the administrative committees of the local water users' associations were charging rates which covered the full operation and maintenance costs. In addition they all had reserve funds for repairs, expansion and improvements. These achievements stand in sharp contrast to the municipal systems where charges often cannot cover costs. Source: IEOS (1980). Sistemas de agua potable en el area rural participación comunitaria. Quito, Ecuador, Instituto Ecuatoriano de Obras Sanitarias.

4. ADMINISTERING THE SYSTEM

In the previous chapter an overview has been given of the different financing systems that can be used to obtain water revenues. This chapter discusses which organizations can be involved (section 4.1) and which tasks are necessary for the continued functioning of the water supply (section 4.2).

The chapter also discusses the organizational aspects of community-based maintenance, because good maintenance is an important pre-condition for good payment by the users. When the water supply is functioning poorly, the users do not like to pay. This can be the start of a vicious circle: poor payment leads to lack of funds for maintenance and repairs. This in turn reduces the reliability of the water supply, resulting in a further deterioration of user payment.

4.1 Local management organizations

The basic decision on how the community water supply system is financed will generally be made as part of the initial consultations with the community. Detailed arrangements are preferably carried out with a smaller group. This may be a local council, development committee or other **existing administration** (4.1.1), **community-level organizations** (4.1.2), or a **special water committee** (4.1.3).

4.1.1 Existing administration

In many cases, local councils become responsible for local maintenance, administration and financing of recurrent costs. Although they often have the necessary formal authority to collect community contributions, there are several factors which can reduce their effectiveness as administrators of a piped water supply. These are:

- local councils may be established at the level above that of a single village or community. This widens the physical and psychological distance to the users. Besides, the community

water supply may cover only part of the administrative area, or cut across two adjacent administrative areas;

- local councils have many other tasks, which compete with the water supply for time and money;
- responsibilities and authority accumulate within a small group. This increases the chance that funds meant for maintenance and repair of the water supply are spent for other purposes.

In some areas, community development committees have been established which are also responsible for the water supply (see Example 4.1).

Example 4.1 Financing and management by Local Development Associations

The Local Development Associations (LDAs) in the Yemen Arab Republic are district organizations of 40 to 50 representatives elected from the adult male residents of each locality. For every 300 to 800 people one representative is chosen for a three year period. Together, the LDAs form the Confederation of Yemen Development Associations (CYDA). Presided over by the President of the Republic, the CYDA consists of elected members, representatives of the service ministries and national planning organization, and an appointed professional cadre of Committee Directors. Each LDA prepares its own development plan for incorporation into the national 5 year plan. LDAs also prepare annual reports on their expenditures and activities.
For water projects, the Public Services Department of the CYDA provides hydrogeological services. Another national level activity is to establish the legal framework in which cooperatives formed by the LDAs can function. Construction and maintenance are financed from the annual religious tax, the zahat, from a 5% import tax, and from private contributions. The great success of the LDAs in construction now make it necessary to strengthen local maintenance and management. Areas of development include technical training, financial control and election of modern leadership.
Source: Dobert, Margarita, (1985). Yemen self-help associations flourish. Development Forum, XIII, 2, p.4-5, p.15.

Although these committees also have various responsibilities, a reliable domestic water supply is often one of their priorities. Experiences are most positive with committees which have been formed spontaneously, or through democratic elections. They have either carried out their own projects, or requested and supported government

projects (1).

4.1.2 Community-level organizations

In general, it is therefore preferable when organizations at user level are directly involved in the project. Usually this level will be a village, or a neighbourhood in urban areas, but organization may also occur at still lower levels, such as a street or a group of houses whose inhabitants form a social unit and share, maintain and finance communal facilities. Higher level organizations in such cases usually have a role in supervision, conflict mediation and other forms of assistance on the request of the community or user groups. An example of a division of responsibilities at various administrative levels is given in Table 3.

The delegation of responsibilities for rural water supplies to the community also raises the question of community rights. Apart from the right to have a say in the type of water supply they will be paying for, what capacity and influence will communities have in getting the service they pay for? In other words, communities should be certain of sufficient technical and management training, tools, spares and authority to do their part of the work. Also, when certain tasks are done by government staff or third parties, mechanisms may be needed to ensure that these reponsibilities are honoured and that there is some liability for the quality of the system built or repaired with funds from the community.

In small communities with a simple piped water system it is sometimes possible for one respected villager to carry out all administrative tasks under the authority of the local leadership. Such a person can for example be the community health worker, when he or she is paid by the community and does not yet have a full-time job. Elsewhere, the work is done by a single (paid) community member, although formally, the administration is done by a water committee (see Example 3.13 in previous chapter). In other cases, existing community organizations

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(1) See, for example, IRC Technical Paper 12, p. 134 and IRC Technical Paper 22, p. 169, A12. Women and the poor are often not represented on formal community bodies.

such as a local development, welfare or health committee can sometimes also take care of the local management of the commity water supply ([1]). But should a combination of tasks be too difficult, the work is best carried out by a **special water committee.**

Table 3: Division of tasks between levels of administration

Level	Type of organization	Tasks and activities
Neighbourhood, hamlet, ward	Water users group, tap committee, neighbourhood group	Management of communal waterpoints. Collection of water rates. Advice on rate classification. Communication with users and higher level organizations.
Community, township	Community water committee, water board, local or municipal council, community development committee	Management of community water supply. Rate setting and administration. Organization and financing of maintenance. Employment of local workers. Communication with users, higher level organizations and government agencies.
District	District development committee, district water committee, district water council	Supervision, advice and assistance to community organizations.
	Governmental departments (Water, Health, Local Government etc.)	Community organization. Training for maintenance, administration and community hygiene improvements. Monitoring and evaluation.
Regional, zonal	Governmental departments (Water, Health, Local Government etc.)	Programme supervision, monitoring and evaluation. Development of training programmes. Administration of programme funds.
National	Governmental departments (Water, Health, Local Government etc.)	Programme and policy development, financing, evaluation, legislation.

([1]) Points for consideration when reviewing the capacities of existing local organizations to manage the community water supply may include: main functions and their relationship with water and sanitation; history and duration of existence; size and type of membership; leadership; representation of all sections of the community; link with traditional leaders and modern authority; accountability to members or people it represents; participation of members in decision-making, responsibilities, benefits; proven mobilizing and managerial capacities; time and capacity to handle new functions; incentives, training and other support needed for new tasks; and need for structural changes. See Perrett, H. (1980). Social and behavioural aspects of project work in water supply and waste disposal. Washington D.C., U.S.A., World Bank, Annex 4.

4.1.3 Special water committees

A water committee is a committee which is formed with the specific purpose of administrating the community water supply system. The water committee may represent the whole community when everyone can use the improved water supply. Alternatively the committee may represent only the members of a water users' association or cooperative. Another name for the representative body of a water users' association is a water board. An advantage of a special water committee or water board is that participation in the local planning and administration of the water supply is their only concern. A separate committee also facilitates representation of all sections of the community.

Membership

A balanced representation of the community in the water committee is important to make full use of local authority and expertise and increase the likelihood that the interests of all user groups will be protected. A balanced membership usually means:

- both men (for authority) and women (for direct interest and strong motivation);
- both old persons (for authority and respect) and young people (for initiative and drive);
- persons with relevant modern and indigenous knowledge (e.g. a schoolteacher, modern and traditional health worker);
- representatives from all factions and socio-cultural groups ([1]).

Community water committees may be formed by election, appointment (by the project agency but more usually by the local authorities) or a combination of the two. In all cases it is most important that its members are respected and trusted by the whole community, represent the interests of the whole community, including those of disadvantaged groups and are capable of carring out their specific responsibilities.

Membership of women is important because they are the immediate users and beneficiaries of a domestic water supply. They are therefore the

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([1]) IRC Technical Paper 17, p.37 and 40.

most motivated to keep the system functioning, through formal or informal action. Women also know from personal experience and from communication with other women when the functioning of the system should be improved for greater user satisfaction. Increased user satisfaction in turn contributes to adequate user payment. And in many areas women play a role in the management or co-management of the household budget ([1]).

Women are often involved in the informal management of traditional water sources, but are frequently excluded from managing modern water supplies ([2]). A first condition for their involvement is therefore to obtain the support of the local leaders. The women themselves should also be aware of their common interests, be united and receive active support from the project staff. Often, on the invitation of the project and the local leaders the women themselves have chosen representatives who were both suitable and acceptable. Acceptability is further increased by making female committee members responsible for women-specific tasks, in accordance with their traditional roles and responsibilities, such as health aspects and communication with the users. Women are also frequently treasurers of water committees.

Should committees include existing leadership? Their authority and support will usually be needed. But it can also mean domination and monopolization by local elites. The actual solution depends on local conditions ([3]). In some cultures traditional leaders represent the interests of all, their authority is generally respected, and is recognised by the state in addition to modern political and administrative leadership. Their presence on or support of water committees is very valuable in such cases. Leaders which formally represent only certain groups have sometimes become real community

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([1]) See IRC Technical Paper 22, p.51, 54, 63-64, 71-75, and 102.
([2]) See IRC Technical Paper 22, p.25-28.
([3]) See for instance, IRC Technical Paper 17, p.37, 130-132 and 135-136. See also Paul, B.P. and W.J. Demarest, (1984). Citizen participation overplanned. Social Science and Medicine, 19, 3, 185-192 and Glennie, C., (1983). Op.cit., p.43.

leaders and have been accepted by all. In cases where the presence of or domination by formal leaders on the water committee might introduce conflicts or inequitable service, it may be possible to involve them as honorary members only, or to form an independent committee as a sub-committee to a formal local body. Sometimes, however, it cannot be prevented that local elites influence decisions to their own advantage. In that case it is advisable that the project agency retains final control, e.g. by designing and checking community payment systems.

Scheme committees

Some piped supplies serve more than one village. It is then advisable to establish an overall scheme committee. In very large schemes, there may also be branch committees. These represent all communities on a single branch of the distribution network (see Fig. 1). Higher level committees make it possible to divide recurrent contributions to the total scheme (salary of operator/intake watchman, maintenance of intake and storage tank, pipeline repairs, acquisition of fuel) over the participating communities. Each community then looks after the division of contributions among their own users. In addition, they look after the maintenance of their own distribution systems. Sometimes, communities are only responsible for the upkeep of the distribution system within the borders of their community, while the water agency operates the scheme as a whole. In that case, scheme committees can arrange for convenient operating hours, solve problems of allocating water between villages, provide regular supervision of agency-paid operators, finance a stand-by operator, and so on.

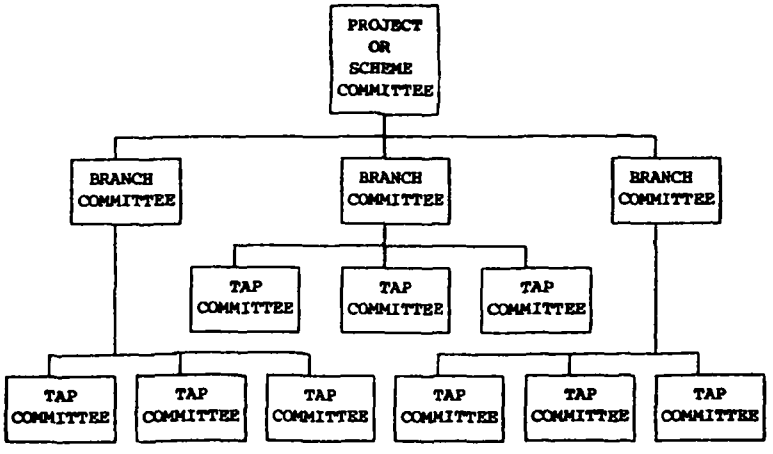

Fig. 1: Community management structure of rural piped water supply systems in Malawi.

Tap committees

Some piped water systems also have tap committees. These committees look after the upkeep of hygiene around the tap, and carry out basic maintenance and repairs (new tap leathers or taps, platform repairs etc.). They may also collect water rates. With rural gravity supplies, they sometimes collect funds to pay the community workers (e.g. the intake watchman) and buy spares for basic repairs (washers, taps, cement, etc.). Because these committees are closest to the users, they should also have a role in higher level local management. Their knowledge about family size and composition, water use and payment capacity is useful for developing more equitable rate payment systems. They can also play a valuable role in the two-way communication between the users and the general committee ([1]).

Tap committees often include several women. Asking the members of each committee or group of committees to elect a representative to the higher level branch and scheme committees provides a means to increase women's representation on higher-level committees as well.

Federations of association

Agencies can also assist individual groups and communities to solve their problems by promoting contacts and exchange of experiences between the various users' groups. In some countries, local water committees are in turn united in regional associations with periodic meetings ([2]). In particular, much can be learned from successful communities and groups. How did they realize their success, and can its elements also be applied by other groups? Here again, the water agency can assist by organizing area-level meetings and by assisting in analysing the functioning of the groups and identifying the reasons behind those which are most successful.

([1]) See IRC Technical Paper 22, p.66-68.

([2]) Federations of water users' associations exist for example in Peru and the Philippines. They meet to discuss problems and may also organize group purchases. In these ways they reduce the need for external support from the water agency.

Status and remuneration of community water committees

For effective administration, community water committees need a legal status of their own. Alternatively, they can derive their authority from another, legal organization under whose authority they operate as a sub-committee. In some cases it takes a committee from three to six months to get the necessary legal status from higher level authorities. However, this time is not wasted: "Final authorization has a tremendous value for committee members. They are very proud of their 'papers' and they take the responsibility seriously. Official documents also give the Potable Water and Latrine Committee greater legitimacy in the eyes of the community members" ([1]).

Statutes help to regulate the functioning of the community water committee. They guard against the accumulation of power when perhaps committees do not meet, functions are combined in the hands of one or two individuals, or meetings and committee elections are held irregularly without sufficient participation of the users. Issues that are commonly covered in the statutes of a local water organization are summarized in Table 4.

Statutes and service regulations can also be a useful tool in the training of the water committee and in informing the users about the local management. Often water committees need some guidance in understanding their functioning and authority. Users also need to know what the committee will do and what their own rights are, e.g. as participants in an annual water users assembly.

([1]) Buckles, P. (1979). Appropriate technology for water supply and waste disposal. A behavioural case study: two rural communities in Guatemala. in M. Elmendorf (ed.), Eight case studies of rural and urban fringe areas in Latin America. (P.U. Report no. RES 23), Washington D.C., U.S.A., World Bank, Energy, Water and Telecommunication Department, p.84.

Table 4: Issues commonly covered in the statutes of a local water organization.

General characteristics:	Name, place of residence and purpose of the organization; Date of establishment; Legal status;
Membership:	Qualifications and conditions for membership; Procedures for application, acceptance and cancellation as member of the organization;
Sources of income:	Contributions, rates, subsidies, loans and other rightful revenues;
Committee(s):	Composition: number and functions of committee members; composition of executive committee, and sub-committees where necessary; Election: occasion; procedure; length of term-of-office; possibility of re-election; by-elections in case of resignation etc.; Representation: of the interest of all user categories, including women and low-income households. Functions: responsibilities and authority of each function, character of the work (voluntary or paid; type of remuneration)
Meetings:	Committee(s): frequency, purpose and authority of meetings of the committee(s). General assemblies: frequency of assembly; minimal period between announcement and assembly; user information on time, place, purpose; Purposes of meeting: rendering an account of the preceding period; appointment of a financial control committee for the next financial period; recruitment and election of committee candidates; other relevant business etc.; Validity of meetings: representation of various user categories; voting rights (e.g. heads of households only, or male and female heads, or one adult, one vote); quorum for important decisions; conditions for a general meeting on request of the users;
Changes:	Procedures for changing the statutes; procedures for winding up the organization.

Members of a water committee usually do their work on a voluntary basis. Typical time investment after completion of the construction is one to two days per month. Sometimes, however, the work involved is rather substantial (e.g. rate collection). In that case, committee members usually get some compensation. This may have the form of a

reduction or waiving of the family water rate, or a small salary. An agreement on the voluntary or paid character of the work prevents misconceptions and mismanagement of funds on this point.

4.2 Responsibilities and authority of local administration

4.2.1 Tariff setting

In programmes constructing a standard type of water supply with more or less equal recurrent costs, universal water rates are sometimes charged throughout the country of region. In Guatamala, for example, the Ministry of Health charges a common fee in all its water supply systems for the use of public standposts and group connections. In 1978 the fee was 0.25 cents per month per family. This fee constituted about 1% of the average monthly income of a farmer or day labourer, and 0.4% of the average income of merchant families ([1]). A national rural water supply tariff has also been established in Honduras, based on a study of recurrent costs of 70 chemes and assessment of people's willingness and capacity to pay for piped water ([2]).

Other programmes leave it to the committees themselves to establish the rates necessary to cover local maintenance and repair costs. A better alternative is that the promotor or sanitarian assists the administrative committee to estimate the local recurrent costs and determine a cost-covering and equitable rate system. Communities which are relatively wealthy and fortunate enough to have a water supply with low recurrent costs may also be required to charge a certain minimum rate to facilitate cross-subsidy to less fortunate communities by the district or zonal authorities concerned. An example of a flat rate system calculated in a Colombian village for presentation to the users in the project planning stage is given in Fig. 2.

At the same time, the committees have to look at the most practical time and frequency of rate payments in their community. This will often be different for the various occupation groups, so that some experiments may be necessary (see Example 2.5 in the earlier chapter).

([1]) Buckles, P.K., op.cit., p.51, 60.
(2) Uzin, L., op.cit., p.43.

HOUSEHOLD RATE: Preliminary Calculation: x
Final Calculation : _

NATIONAL INSTITUTE OF HEALTH
Section Huila
COMMUNITY: Alto de los Idolos
PREPARED BY: Eng. Guillermo Espitia Gómes
MUNICIPALITY: Isnos
TYPE OF WORK: Piped water supply (gravity)
DATE: 15-7-1976

1.0 General Data:				
1.1 Number of inhabitants			1200	
1.2 Number of houses			200	
1.3 Total number of initial subscribers			100	
1.4 Number of subscribers for the calculation			100	
2.0 VALUE OF THE WORKS				
2.1 Buildings, concrete and brick structures, others			$ 402,801.18	
2.2 Pipeline, distribution network and accessories			$ 2,113,740.12	
2.3 Machinery and equipment			$ -	
2.4 Administration			$ 201,323.30	
			$ 2,717,864.60	
3.0 MONTHLY COSTS AND CALCULATION OF THE HOUSEHOLD RATE			TOTAL COST	COST PER SUBSCRIBER
3.1 For administration of the work				
3.1.1 Salary maintenance workers	$ 100.00			
3.1.2 Social security for workers	$ 40.00			
3.1.3 Insurance	$ 10.00		$ 170.00	1.70
3.1.4 Secretariat	$ -			
3.1.5 Transport	$ -			
3.1.6 Stationery and writing utensils	$ 20.00			
3.2 For operation and maintenance				
3.2.1 Fuel lubricants				
3.2.2 Energy			$ 510.00	5.10
3.2.3 Disinfectants	$ 510.00			
3.2.4 Contingencies				
3.3 Reserves for depreciation				
3.3.1 0.00049148 x 402,801.18 (value buildings and structures)	$ 197.98			
3.3.2 0.00133713 x 2,113,740.12 (value pipes, network and accessories)	$ 2,826.07		$ 900.00	9.00
3.3.3 0.00624749 x (value machinery and equipment)	$ -		(30%)	
3.4 For loan repayment				
For a loan of $ 517,372.79 of 20 years, the monthly installment, including 6% annual interest, amounts to				
527,372.79 x 0.007265 (loan without interest coefficient for years of amortization)		$ 3,831.36	$ 3,831.36	38.31
TOTAL MONTHLY COSTS			$ 5,411.36	
TOTAL HOUSEHOLD RATE				54.11
4.0 MONTHLY INCOME				
100 (no. of subscribers) x 55 (approx. rate)		$ 5,500.00		
5.0 BALANCE				
Monthly costs			$ 5,411.36	
Monthly income			$ 5,500.00	

Fig. 2: Estimated recurrent costs and monthly water rate presented to a Colombian community for local decision-making.

Community deposits

Some project agencies insist that before construction, the communities deposit the estimated amount needed for the first maintenance period in a special project account with the water agency. This deposit serves both as evidence of the community's commitment to the project and as a first reserve for the maintenance costs. However, it is not yet clear if these deposits have the desired effect, apart from sorting out communities which have no interest and/or organizational capacity. Easy initial collection in some communities is no guarantee that the users will continue making regular payments in future. In fact, creating a maintenance fund in advance may delay a more regular collection of maintenance funds until the first reserve is depleted. Therefore, both administrators and users do not get used to making provision for regular payment right from the start. But when it is decided to try this system, communities should in any case retain some control over the deposits to prevent substantial amounts of village money being tied up outside the community for long periods ([1]). With a community-controlled account, surplus money can also be used for other community development projects ([2]). Deposits outside village control also create risks of unapproved use by external parties, thus contributing to village reluctance to pay.

4.2.2 Rate collection

With unmetered connections, different types of rate collection are possible. A common system is to collect user payments through home visits. This work is frequently done by women. This apparently fits in with women's patterns of social visiting and housekeeping, including managing the family's daily household expenditures. In some cultures, husbands would also object to male collectors visiting their house during their absence. That women have fewer opportunities to abscond with funds may be another factor for their involvement as rate collectors and treasurers.

([1]) See IRC Technical Paper 12, p. 36.
([2]) See, for example, Buckles (1979), op.cit., p.82.

Instead of collecting the rates through house calls, the users or the committee can also decide that rates are paid at a periodic meeting or at the office or house of a local functionary. This works quite well in densely populated communities, but is more difficult in dispersed settlements. In the latter case, it may be possible to organize a neighbourhood-based collection system, after which the central collector collects the funds from each neighbourhood.

With metered systems, two types of rate collection are used. The high costs and problems for users of separate reading, billing and payment of metered water have already been mentioned. To reduce this, direct billing and charging is used for group connections in Malawi. In addition, the water agency sends a formal statement on the groups' water consumption and rate payment over the preceding three months to the tap committees concerned (see Fig. 3). This helps the tap committee to keep an overview of their group's water use pattern and their financial position, and helps avoid misuse, non-payment and administrative mistakes.

In Malawi, experiences with user group continuity and rate payment have been most positive for taps in the business centres. This is probably due to the steadier income and the greater need for a convenient water supply throughout the year. In farming areas membership peaks after selling the harvest and when the traditional sources dry up ([1]). During the rainy season the availability of alternative water sources coincides with the shortage of money and food in rural areas. A seasonal charge would perhaps work better for these user groups.

Defaulting

To reduce defaulting on rate payment, water agencies have employed several types of measures. In the Dominican Republic, commercial agents were introduced in an attempt to improve cost-recovery and reduce the high percentage (33%) of taps disconnected for non-payment. Each agent is responsible for 15 piped water supplies.

([1]) See: Kwaule, F. (1985), op.cit., p.3.

WATER DEPARTMENT
WATER SUPPLY BRANCH
DISTRICT WATER SUPPLY FUND
WATER ACCOUNT

Chief Water Supply Officer
or Chief Water Supervisor .....
.....
.....

TO: TAP COMMITTEE
CWP No. ..... A/C no. .....
CENTRE: .....
.....
.....
.....

QUARTERLY STATEMENT No. .....
(for Communal Water Point)
for Months of .....,.....,.....,19..

					BALANCE	
					Credit	Debit
Balance brought forward from previous period					.....	
Date	New meter reading	Old meter reading	Consumption Cubic metre	Consumption Debit (Kwacha)		
.....	.....	.....	.....	.....		
.....	.....	.....	.....	.....		
.....	.....	.....	.....	.....		

Date	G.R. Number	Credit (Kwacha)
.....	.....	
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
Total credits for quarter		.....
Total debits for quarter		.....

☐ Your account at End ..... 19..
was in good standing and showed a credit of: ..... | |

☐ Your account at End ..... 19.. showed a debit of: | .....
This amount must be paid soonest

NOTE TO TAP COMMITTEE:

1. Payment of water from your communal water point should continue to be made by using the form "Remittance Advice for CWP" which is issued every month by the Plant Operator. However, particularly in case this statement shows a debit balance, you may use in addition the Remittance Advice attached below to effect payment.

2. This statement, which is issued only every 3 months, is to enable the Tap committee to verify that the various payments made have effectively been received by the WATER DEPARTMENT.

3. Your attention is drawn to the Agreement which governs the conditions of supply for CWP and in particular to the fact that CWP accounts should maintain at all time a credit balance.

- -

REMITTANCE ADVICE

TO: Chief Water Supply Officer
or Chief Water Supervisor
.....
.....

Invoice No. .....
From: CWP no. .....CENTRE .....
ACCOUNT No. .....
Total Due K .....

Received K ....., under G.R. No. .....dated .....19..
Cashier's signature and stamp .....

Fig. 3: Quarterly statement on group consumption and group rate payment in communal water point schemes, Malawi.
Source: Carrié, R. (1985). Op.cit., Appendix 6.5.

He visits these systems once a month on four scheduled routes. During the visit, he audits the books with the treasurer of the water committee. He also collects the community loan repayment and sends it through the local post office to the zonal water office. He meets with the water committee to discuss problems and matters of interest, and accompanies the treasurer or bill collector on home visits to households whose payment is in arrears. These efforts resulted in a payment of 92% of the bills sent out in the first half of 1975 ([1]).

An alternative system is used in Honduras. Here, users of group, yard and house connections of rural water pay a safety margin against defaulting of up to 100% on their monthly water rates. This ratio was decided nationally and has been based on the divergence between sums invoiced and sums collected. The practice enables the water programme to cover its recurrent costs and cross-subsidize rural schemes where diesel pumps or treatment are necessary. However, it has also raised the costs of piped water to 4% of the annual income of households earning the legal minimum wage, as compared to an average expenditure on water from piped and traditional sources of 0.03% ([2]). It would therefore be preferable to use other measures against defaulting which do not punish those paying in time for those who do not, and enable more people to take a private or shared connection.

Social pressure within the user organization itself may work especially well in small, closely-knit communities. In the Guatemalan project mentioned before, names of debtors have been announced in the general meetings of the community. Another measure to control the use of shared taps or handpumps has been to lock up the water point and give the key to a nearby household. However, it appears that this system only works when the decision is made democratically and no single individual has a monopoly over the operation of the tap ([3]).

To prevent debts developing, users' groups in Malawi have to maintain a safety credit with the water agency to a maximum of 120% of their

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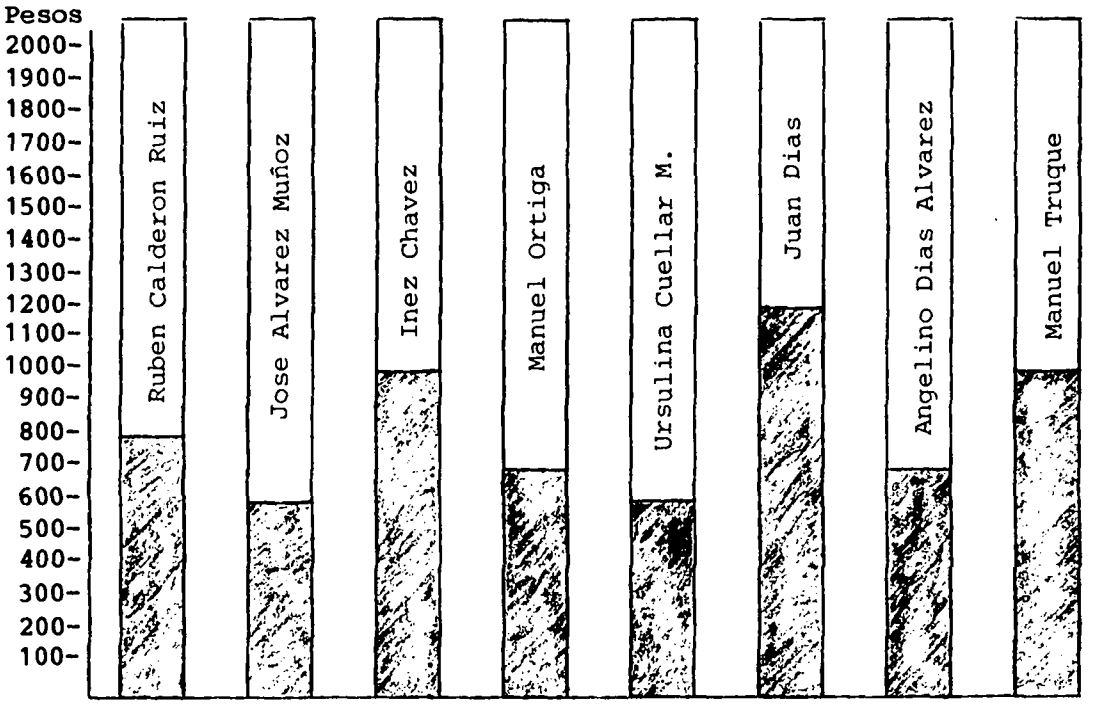
([1]) IRC Bulletin 13, p.137-139. No information has been obtained on longer-term experiences.
([2]) Uzin, L. (1976). Op.cit., p.55-59.
([3]) See for example, IRC Technical Paper 22, p.68. Similar experiences exist in Malawi and Kenya.

monthly group rate. There has however been some reluctance in the groups to pay ahead for water not yet received. The system is therefore used with some flexibility. In other cases payment in advance is stimulated by giving a small reduction on the user rates. Some city councils also reward promptly paying users' groups with material and technical advice for an expansion of their water system, or for other self-help projects.

To facilitate payments of connection fees and at the same time reduce the risks of defaulting, the rural piped water supply programme in Colombia uses a visual record to register household contributions (Fig. 4). This makes it easy to identify families lagging behind and creates a certain degree of competition between households.

Place:..... Type of project:.....
Starting Date:..... Expected completion date:.....



Date of chart:.....

Fig. 4 Monitoring of payment of connection charges by local households.

Source: A. Whyte (1982). The Colombian field manuals and training guides for the promotion of community participation in water and sanitation schemes. The Hague, The Netherlands, IRC, p.77.

4.2.3 Accounting and financial control

The financial management of a community-operated and maintained water supply should be simple yet watertight. Allowing some people to get away with using taps without payment or misappropriation of funds is a sure way of running into problems with the majority who do pay for their water.

A simple but reliable system of financial records can greatly improve community management of piped water supplies (see Example 4.2). Water rates can be adapted in good time and households with payment problems dealt with according to their circumstances. Monitoring the rate of consumption of diesel for example, can indicate leakages, loss of fuel, changes in the efficiency of the pump or misappropriation. With good record keeping and record reviewing, water committees can not only work more effectively and take corrective action, but also justify their action with the users to whom they are responsible.

Example 4.2 Better accounting improves water supplies in Tonga

"The difficulty with the original accounting system was the high number of entries and the small amounts involved..... A simpler system was therefore proposed, and at the same time the responsibilities of treasurer and secretary were more clearly defined; the treasurer was described as "a keeper of all financial records, not a keeper of cash". The secretary's duty was to fill in the receipt book, giving reason for payment, the amount, and the date. The receipts were numbered and made out in duplicate, with one copy for the rate payer and one for the treasurer. In this book a record of all income was kept.
A register of ratepayers was kept with columns for each month. The number of the receipt was entered under the appropriate month when payment was made. A third book, the balance book, contained two columns for income and expenditure. Income and itemized payments were entered before each monthly meeting of the water committee. The total under each column could then be easily compared at the meeting.
A course was organized to teach the new accounting method to participants from 33 villages, divided into five groups. Two of the participants left the course voluntarily because their literacy level was below that required.
The participants were provided with free receipt books, registers, and balance books. They were asked to provide actual data from their own villages for the exercises. Redefining the roles of the treasurer and secretary took most of the first day of the two-day course. Those who were not good at arithmetic were persuaded to use students in the

village. An additional feature was the emphasis on auditing by villagers other than the committee members.
On follow-up three months later all villages were still using the system. Some villages had changed their treasurers but the water superintendent and the immediate past treasurer were able to teach the system to the incoming one".
Source: Finau, S. and Finau, S.A. (1983). Better accounting improves water supply. World Health Forum, 4, 169-171.

In systems financed from voluntary fund-raisings or general community income the responsibilities of the water committee may be limited to making a budget for the next maintenance period on behalf of the local administration and keeping a record book of all income and expenditure. Formal bills and receipts for all financial transactions facilitate the record-keeping. For this purpose the treasurer needs to have a numbered receipt book at his or her disposal for every payment made into the water fund. For payments made from the water fund or the cash in hand, the beneficiary can be asked to give his or her own receipt, or to sign a payment voucher, indicating the amount of payment, date, name of the payee, number and details of services or materials provided, costs, total, and dates and signature of payer and payee.

Placing the water funds in a special bank account makes it possible to draw interest, keeps the money safe and separated from other village enterprises, and makes it easier to maintain an overall picture of the financial situation. It also enables the committee to build-in further safeguards, such as two signatures for every withdrawal of money.

Most important is the establishment of an independent committee to audit the accounts once a year. The more democratically this auditing committee is created, the greater the chance that financial malpractices threatening the functioning of the community water supply will be prevented.

In systems where payments are made by individual households, either as water rates or as periodic contribution, the treasurer can in addition keep a register of user households. In this register, he or she records who have paid their contribution, and under which receipt number. It is then easy to see who have not yet paid and need a

follow-up visit. Also it helps the auditors in checking non-payment, identifying possible reasons, and comparing the books and receipts.

A training course in simple bookkeeping and financial management is one of the crucial elements for successfully implementing community-based water supplies. Water agencies themselves do not always have the necessary expertise for this kind of training, as the financial systems to be developed and the training at village level differ considerably from those of the water agency itself. However, other departments and services such as those for Community Development, Cooperatives or small-scale industries may have valuable experience and materials for this purpose ([1]). Much could also be learned from an exchange of materials and experiences with water agencies which have already developed such training programmes, as in the case of Tonga (Example 4.2), but also in programmes in the Philippines, Colombia, Kenya, Burundi and Burkina Faso.

Periodic review of the books by water agency field staff, sanitarians or community development workers and the treasurer of the water committee and periodic refresher training for selected members of the community water committees and village auditors are other elements in a successful community accounting system.

4.2.4 Selection and remuneration of community workers

To maintain the water supply, water committees frequently have to select candidates for training as community water supply workers during construction. These workers may include local operators, watchmen, pump mechanics, pipe repairers and water point caretakers. In the selection, both technical and socio-economic criteria play a

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([1]) Training for village bookkeeping exists, for example, for village building programmes in Malawi and primary health care programmes in Bolivia, Nigeria and Senegal, see: Rep. of Malawi (1971). Training local leaders: a handbook for District Community Development Assistants, Limbe, Malawi, Ministry of Health and Community Development, and Stinson, W. (1984). Potential and limitations of community financing, World Health Forum, 5, 123-125.

role. Candidates should not only be able to master each technical task and keep records and tools in order, but also report regularly to the committee and maintain contacts with the users. Conscientious people who are residents in the village and have social and economic ties in it will be more likely to stay on and use the investments in their training to the benefit of their community. The committee can help the project field staff to make a well-reasoned choice of community workers, by adding their social knowledge of their fellow community members to the fieldstaff's technical knowledge of the jobs to be done.

Another decision the committee has to make is whether to pay the various community workers or not, and if so, how much and in what form. For some jobs and in some cultures, the official character and status of the trainee and the position may be sufficient reward. Regular communication with the committee and involvement in water supply meetings can also stimulate continued functioning. There may also be some compensation in kind, such as the right to plant vegetables or fruit trees at the end of a drainage channel for a waterpoint caretaker, or the waving of other community duties. Other options for remuneration are to combine the work on the water supply with another, paid, community position, such as community health worker, or employment of salaried workers. These may either be paid a regular salary or be paid separately for each job done, depending upon the character of the work. Some communities also share one worker between them for the more occasional jobs, such as repairing hand pumps or pipes and tap-sites in piped water systems.

Decision-making can be aided by looking at the frequency, complexity and total duration of the tasks that must be done (Table 5).
It can also help to compare the work and salary with that of others doing similar work in the village (Example 4.3). Sometimes however, government or union regulations forbid the payment of salaries lower than the official minimum wage. The special status of community-based

Table 5: Example of a job description and task analysis for waterpoint caretakers.

Function : Waterpoint caretaker.

Duties : Preventive maintenance; simple repairs; site management; user communication; recording and reporting.

Tasks : Preventive maintenance: visit to waterpoint; control of leakage and hygiene; cleaning of site and drain; upkeep of surroundings. (Frequency : daily)

Simple repairs: replacement of washers; repair of cracks in masonry; repair of bathing screens, fences, etc. (Frequency : occasionally, perhaps a few time a year)

Site management: ensuring proper tap operation and water use; management of laundry and bathing facilities; advising the water committee on site maintenance, user regulations and other relevant issues concerning the waterpoint. (Frequency : daily to periodically)

User communication: liaison between the tap users and the water committee; information on reasons and duration of breakdowns; demonstration and discussion of proper water use. (Frequency : periodically, perhaps several times a year)

Recording and reporting: recording and reporting needs for maintenance, repair and water use to the community water committee or other local organization administering the water supply. (Frequency : periodically, perhaps several times a year)

water supplies may in such cases require a government policy decision to avoid small communities having to pay a full salary for a part time job, such as local operator or caretaker.

For most of these jobs, often only men are considered. This does not mean that maintenance work cannot be done just as well by women. Looking after a water point, for example, may be more suitable for

Example 4.3 Deciding on the remuneration of village workers

For the maintenance and repair of their new water supply, the villagers of Msimba village in Tanzania have chosen two candidates for training. Both are young men whom the water committee wants to pay to ensure the continuity of their work. The original salary decided upon by the water committee is 300 shillings per person per month. On discussing this arrangement with the community development worker the committee was first apologetic, since the official minimum salary is 810 shillings a month. However, a joint comparison of the tasks of maintenance with the duties of other community-paid workers showed that the actual work would still be overpaid. Moreover, a review of the income and expenditures for the water supply and other community services showed that the village cannot keep up the proposed salary for the two maintenance workers. The committee therefore decided to work out a more realistic system of compensation for the two candidates.

women. A woman visits the water point every day and can combine this work more easily with site cleaning, preventive maintenance and communication with other women about water use, site upkeep and care of children. For the authority needed for site management she can call on village leaders and the water committee, if necessary. In selecting the most suitable person, careful consideration and consultation with the users involved are also needed. Imposing the work on someone who at first thought seemed suitable has proved not to work ([1]).

Training local women for maintenance tasks in a community water supply is possible at least in some cultures because the water supply is a woman's concern. The project can in that way benefit from the lower mobility and career orientation of local women as compared to men and their greater sensitivity to social pressure from other women to do a good job. Another possibility is to train both husband and wife for daily operation and maintenance. In that way, no stand-by has to be paid for by the village, because man and wife can do the work in each other's absence. It also prevents training, status and payment accrueing only to the man, while he informally teaches his wife to do the actual work. It can be discussed with the community how the participation of their candidates in an outside training course can be organized. It may for example be necessary to make arrangements for the work in the farms and homes of the trainees to continue during

(1) See IRC Technical Paper 22, p.68.

their absence.

Because the first responsibility of community workers is to their water committee, the members of the committee should have a clear idea of the tasks of these workers. The committee should also periodically supervise the work. It can therefore be useful when one or two members of the committee participate as observers in the training of the maintenance workers. Alternatively the supervision of caretakers and other community workers can be part of the management training of the committee itself. In more complex systems, e.g. with electric or diesel pumps, operators are often employed by the water agency. Such operators have been found to function better when they are also answerable to a local water committee ([1]).

Periodic supervision is also a necessary part of the continued support from the water agency after the completion of the piped water supply. Supervision and refresher training for community workers can for example be included in the scheduled visits which the agency pays to monitor the functioning and local financing of the water supply and assist in problem-solving when necessary.

4.2.5 Other management tasks

Other management tasks of the local water administration may be the organization of self-help labour, local management of tools and spares, participation in the monitoring and evaluation system of the water agency, communication with the users and the water agency, and participation in planning and implementation of local hygiene improvement activities.

Organization of self-help labour

As mentioned in Chapter 1, community self-help labour can lead to valuable cost reductions. The success of community self-help depends to a great extent on the quality of the labour organization and the attitudes of the project staff to working with the community. Project staff sometimes blame the community for not showing up in sufficient

(1) See IRC Technical Paper 22, p.35, 51.

numbers or delivering poor quality work. However, this may well be due to the fact that the work coincides with other important community activities such as harvesting which the people cannot or should not neglect. Merely imposing the project on the community, or putting sanctions on non-attendance will not increase people's interest and dedication.

Good labour organization can guide the initial enthusiasm when hundreds of people may turn up, and contributes to a high quality labour performance. The usual tasks of the local committee are to divide the work in a fair way, check attendance, supervise the quality of the work and exercise sanctions on defaulters. These sanctions may consist of moral and social pressure, fines or, in extreme cases and with private or group connections, exclusion from use of a tap. Checking defaulting of community contributions in the initial stages sets a good example for controlling user payments later on. Training committee members in organization and management of voluntary labour will in addition develop administrative skills for later water supply management.

Basically, piped water supply projects practise two types of community labour organization. In the first type the whole community turns out for work every day for a concentrated period of time, or once a week, on a free day, depending on the local economy and planning of the work. For large schemes, the total work may be divided into more or less equal parts in co-operation with the local authorities and water committees. Each community or section is then given its part to complete. Thus, in some multi-village schemes in Malawi, the community nearest to the intake does the unskilled work for the headworks. The main line is divided between the remaining villages, and work for the distribution system is done by each village concerned ([1]).

In the second type of labour organization, project and water committee form small work teams of one adult member from each user family, some teams for Monday, some for Tuesday and so on. These teams work together for one day every week, doing all the unskilled work

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([1]) For organizational details, see Glennie, C. (1983). Village water supply in the decade: lessons from field experience. London, U.K., Wiley.

necessary until the water supply is ready. Because the teams stay together for a long time there is usually good control within the group to ensure that members contribute their full share of labour. In addition, the groups usually know which families cannot contribute much labour, such as old couples and single women with small children, so that other solutions can be found for their share. Those not able or willing to work while able to pay may also finance a substitute worker ([1]).

Local committees can also help to demonstrate to their fellow workers what will happen when certain work standards are not maintained, so that the villagers will understand how the quality of their work will affect the quality of their water service. Shallow trenches, for example, can cause exposure and damage to PVC pipes by sun, bushfires and vehicles or agricultural implements. Demonstrations of the risks caused by poor quality work and simple tools for checking, such as a measuring stick to check depth and width of trenches can be useful aids to obtain a better quality of work.

Similar demands of good organization also apply to the project agency itself. When the community undertakes its part of the agreement e.g. the digging of trenches, but finds that upon completion the pipes have not arrived, it will be hard to keep up morale and dedication. And when by the time the pipes arrive the trenches have caved in, it is not surprising to find that few people are prepared to start the work all over again.

Local holding of spares and tools

For regular maintenance and speedy repair of the more simple kind, the administrative committee should know what spares and tools to stock, and how to store them in a safe way. PVC pipes for example, must be stored out of the sun. At the same time, the agency should make sure that new spares and tools are available in the market, and that the committee is kept informed of any changes in prices when the spares are supplied by the agency itself. Good communication between community maintenance workers and water committees is needed to keep

(1) IRC Ocassional paper 19, p.11-12.

committees informed in time of the need for new spares and tools. Some committees may also like to keep spares and tools in storage themselves, for safeguarding and in order to check the frequency of local maintenance.

Monitoring and evaluation

Other tasks of the local water administration may be to see that local records are kept on the operation of the water system and on reasons and duration of breakdowns. The presence of such records makes it easier for national or regional agencies to carry out periodic evaluations of the water supply programme and to introduce structural improvements when necessary. Participatory evaluations also open up opportunities for discussions with the local water committees on what improvements they themselves could make in their own communities. Thus, evaluation becomes a process of self-development for all parties, from which both the general programme and the communities themselves will benefit.

Communication with agency and users

Some types of repair or maintenance may be beyond the capacity of the community. There may also be administrative and management problems, a need to train new community workers, change the local financing system, or a need for more taps or other adaptations to the water supply. For these and similar issues, the local administration should know if and when it can call for help on external agencies, and whether there is any payment involved. To cope with different demands from different geographic areas and keep down support costs, several agencies have established a system of periodic field tours according to fixed routes and time schedules. Although this may mean that communities will sometimes have to wait some time for outside help, it facilitates financial planning and control of expenditures by the agency, and gives the community some certainty of higher-level support.

Communication with the users is a recurrent responsibility which takes many forms. Periodically, the water committees answer for past

management at user assemblies. They may communicate indirectly with the users through caretakers and tap committees. Communication can consist of giving information to the users (e.g. when the supply is temporarily suspended for maintenance work) and of getting information from them, e.g. on user needs. In addition, the water committees can also participate in local hygiene education programmes. An improved water supply can have a tremendous effect on the health status of the community, but only when all or nearly all households use the safer water in a safe way and also improve local hygiene and sanitation practices ([1]).

The community should therefore be stimulated to identify the various remaining risks of disease transmission in their surroundings and to carry out their own programme to eliminate these risks with the available resources ([2]). Members of water committees in several programmes participate in the planning and implementation of such local hygiene improvement activities. They pay home visits and organize neighbourhood discussions to motivate hygienic use of tap water and latrines by all household members.

In user communication and health education, the committee's women members can play a special role, because women can more easily contact other women. Also, some parts of water use, hygiene and family health are the special concern of women, while others, such as latrine construction, may be a man's responsibility. Adaptation to local customs therefore is necessary.

4.2.6 Support from outside the community

Although communities can take on the financing and execution of the daily maintenance and local-level repairs of their water supplies, they can rarely do so completely on their own. Sufficient agency inputs are needed for community consultation in local planning, for health education and sanitation improvements, for training on maintenance and administration and for monitoring of completed

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([1]) See IRC Technical Paper 22, p.35, and p.81-84.

([2]) Boot, M. (1984). Making the links: guidelines for hygiene education in community water supply and sanitation (Occasional Paper Series). The Hague, The Netherlands, IRC.

systems. Unfortunately, these needs, sometimes called 'software', in contrast to the 'hardware' of the water supply systems themselves, are not yet fully reflected in project budgets.

> "In overall financing terms it would be a surprise if the relative share of 'software' support exceeded even 1% of global sector investments" ([1]).

A minimum goal of 5% of the total future investments of donor agencies to be allocated in support of the software components of water and sanitation programmes has recently been proposed ([1]). Comparison with the figures mentioned in Section 2.1 and also with figures from other programmes indicate that these reservations are on the low side for low-cost technology projects like handpump wells and piped gravity systems and that an allocation of 10-15% (not including development costs) is more realistic. So far, evaluations on the costs of community involvement and its effectiveness in terms of maintenance, cost-recovery and self-reliant development have been scarce. Data on adequacy of financing and its relationship to maintenance are lacking in particular ([2]). More evaluation would in particular be relevant for policy makers in the sector.

Procedures for community participation and health education which have been proven effective cannot be established overnight. They need to be developed gradually in the field and where necessary be sanctioned legally and politically. A system for evaluation will have to be established at the beginning of the programme. Technical staff may need practical training in community participation methods and communication skills. Some water programmes employ special promoters for this part of the work. In many cases agencies with a technical base can also benefit from a closer cooperation with local non-governmental organizations and existing social staff such as

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([1]) WHO/BMZ (1985). European Donor Consultation: Report by the secretariat. Bonn, W. Germany BMZ and Geneva, Switzerland, WHO, p.55.

([2]) IRC (1987). Community participation, including the involvement of women, in water supply and sanitation projects. A compendium paper prepared for the Development Assistance Committee of the Organization for Economic Co-operation and Development on request of the Directorate General of Development Co-operation of the Kingdom of the Netherlands. The Hague, The Netherlands, IRC, p.21-22.

community development workers, health workers and women extension workers. Their skills and experience in working with rather than for the community can be a valuable tool in helping to find the best forms of local design and management. These should satisfy both the engineering requirements and the supportive capacities of the project agency, and above all meet the needs and capacities of the project communities. Only then can technologies and financing systems be said to be truely appropriate.

APPENDIX A

SUMMARY OF FINANCING OPTIONS

What?	When?	What for?	Who organizes?	How?
voluntary funds	in communities with a tradition of fund-raising, seasonal income, and a good knowledge and control of payments according to household capacity and benefits	financial contributions to construction; occasional larger contributions to maintenance and repair of simple systems with public water points	traditional leadership, voluntary organizations, e.g. women's groups, tap organizations	targets are set and funds collected periodically through meetings, house-to-house collections, bazars etc. Funds are collected in advance or when required
general community revenue	in communities with own sources of income and a water supply with public facilities	annual maintenance and repair, financial contributions to construction; depreciation and expansion where possible	local government, community water committee or subcommittee	reservation of funds based on the estimated costs and net annual income of the community; cost-reduction or income generation where necessary
cooperative funds	water supply initiated and financed through production cooperative or village revolving fund; no direct payments for water used	annual maintenance and repairs; repayment of construction loan; depreciation and expansion where possible	cooperative's executive committee, community water committee or subcommittee	reservation of funds based on estimated costs and income from cooperative ventures and/or member fees; cost-reduction or income generation where necessary
flat rates	families have private taps, or share taps with well-defined social group, have fairly reliable incomes, and benefit more or less equally	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water committee or subcommittee, board of water users cooperative, local government, tap users' committee	project agency advises on initial rate for approval by users; rates are collected and administered by the local water organization
graded rates	in communities with appreciable differences in water use and benefits and sufficient community spirit to divide user households into different payment categories	repayment of community loan for construction annual maintenance and repairs; depreciation and expansion where possible	community water organization with support from promoters or other social experts assisting the project agency	private tap owners are classified in high and low rate categories, using local indicators of water use and wealth; users sharing taps may pay lower or equivalent individual rate
mixed systems	in communities with large differences in payment capacity and water use, with high and low-income households living in separate sections	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water agency with community water committee or sub-committee	surpluses or private taps are used to finance the costs of free public taps in poorer sections
water metering	in large communities with limited water resources and an efficient administration	repayment of community loan for construction; annual maintenance and repairs; depreciation and expansion where possible	water agency and/or community water organization	meter reading, billing and rate collecting by separate workers, or payment through banks, at central government offices or local branches
vending instead of a piped distribution network	in communities where a socially valuable vending system can be improved, where other solutions are technically, economically or politically impossible	contribution towards financing of the recurrent costs of the agency, and financing of vendor service costs, including upkeep of hygiene and simple repair	water agency with paid operators, women's groups or water sellers' cooperative	water is sold from metered taps at controlled prices; when buying prices are subsidized, selling prices may equal private rates, the difference forming the vendors' income
vending as part of a piped distribution network	in communities where group connections or cross subsidies between private and public taps have not worked	contribution towards financing of the recurrence costs of public taps and the service of the vendors, including upkeep of hygiene and simple repairs	water agency with paid operators or socio-economically appropriate concessionnaires, e.g. women heads of households	
coin-operated taps	not recommended because of their great sensitivity to breakdown and interfence			
direct or indirect water taxes	in communities where the transfer of sufficient funds to the water organization is assured and taxation can be related to water use and costs	annual maintenance and repair; repayment of construction loan; depreciation and expansion where possible	local government service organization for a specific area, e.g. a low-cost housing scheme	taxes are used exclusively for financing one or several basic services; categories of payment are based on level of service or housing conditions

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APPENDIX C

SUBJECT INDEX

APPENDIX C: SUBJECT INDEX

Keywords are based on the Interwater Thesaurus on Community Water Supply and Sanitation for Developing Countries, compiled for IRC by the Water Research Centre, Stevenage, U.K.