

264.1 87 CO

WHO / CWS / 87.5
ORIGINAL: ENGLISH
DISTR: LIMITED

COMMUNITY WATER SUPPLY AND SANITATION

COST RECOVERY IN COMMUNITY WATER SUPPLY AND SANITATION

Report of the Second Informal Consultation
on Institutional Development
Geneva, 5-9 October 1987

LIBRARY
INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)

WORLD HEALTH ORGANIZATION, GENEVA, 1987



264-1-87CO-3671

This report, which presents the recommendations of an informal WHO consultation on cost recovery in community water supply and sanitation (Geneva, 5 - 9 October 1987), together with summaries of working documents and case studies which formed the basis of the conclusions of the Consultative Group, has been prepared by the Community Water Supply and Sanitation Unit of WHO in Geneva. (L. Laugeri, editor).

LIBRARY
INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)

This document is not issued to the general public, and all rights are reserved by the World Health Organization (WHO). The document may not be reviewed, abstracted, quoted, reproduced or translated, in part or in whole, without the prior written permission of WHO. No part of this document may be stored in a retrieval system or transmitted in any form or by any means - electronic, mechanical or other without the prior written permission of WHO.

The views expressed in documents by named authors are solely the responsibility of those authors.

Ce document n'est pas destiné à être distribué au grand public et tous les droits y afférents sont réservés par l'Organisation mondiale de la Santé (OMS). Il ne peut être commenté, résumé, cité, reproduit ou traduit, partiellement ou en totalité, sans une autorisation préalable écrite de l'OMS. Aucune partie ne doit être chargée dans un système de recherche documentaire ou diffusée sous quelque forme ou par quelque moyen que ce soit - électronique, mécanique, ou autre - sans une autorisation préalable écrite de l'OMS.

Les opinions exprimées dans les documents par des auteurs cités nommément n'engagent que lesdits auteurs.

3671

WHO/CWS/87.5

ORIGINAL ENGLISH

**COST RECOVERY
IN
COMMUNITY WATER SUPPLY AND SANITATION**

**Report
of the Second Informal Consultation
on Institutional Development**

Geneva, 5 - 9 October 1987

LIBRARY, INTERNATIONAL REFERENCE
CENTRE FOR COMMUNITY WATER SUPPLY
AND SANITATION (W.S.)
P.O. Box 98100, 2300 AD The Hague
Tel. (070) 874511 ext. 141/142

RN: *isn 3671*
LO: ~~264.1~~ *87C0*
264.1

**WORLD HEALTH ORGANIZATION
GENEVA**

December, 1987

ABBREVIATIONS

CMWSS	Community-maintainable Water Supply and Sanitation
CWS	Community Water Supply and Sanitation
DWSF	District Water Supply Fund (Malawi)
EPFL	Ecole Polytechnique Federale de Lausanne (Switzerland)
ILO	International Labour Organization
IRC	International Reference Centre
LWUA	Local Water Utilities Administration (Philippines)
MWSS	Manila Water/Sewerage System (Philippines)
NRW	Non Revenue Water
O&M	Operation and Maintenance
ONEA	Office National d'Eau et d'Assainissement (Burkina Faso)
PHC	Primary Health Care
RWDC	Rural Waterworks Development Corporation (Philippines)
RWSA	Rural Water supply and Sanitation Associations (Philippines)
UFW	Unaccounted-for Water
VWS	Village Water Supply (Lesotho)
WD	Water District (Philippines)
WHO	World Health Organization
WHO/SEARO	Regional Office of WHO for South-East Asia

	Page
TABLE OF CONTENTS	
<u>INTRODUCTION</u>	1
The Consultation Summary of findings	
<u>PROBLEM DEFINITION</u>	3
Importance of cost recovery Difficulty to recover full cost Cost containment Cost recovery	
<u>COST CONTAINMENT</u>	6
Intersectoral action Decentralization Some limits to decentralization Privatization Some limits of privatization Preventive maintenance Metering and minimizing non-revenue water	
<u>COST RECOVERY</u>	13
Equity Feasibility Rules of thumb Social and public health aspects Issues in rural CWS Autonomy (and privatization) Efficiency and expansion Note on revolving funds	
<u>RECOMMENDATIONS OF THE CONSULTATION</u>	
<u>COST RECOVERY IN PIPED SYSTEMS (WORKING GROUP I)</u>	19
General principles <ul style="list-style-type: none"> (i) Financial and administrative autonomy (ii) Financial management and planning (iii) Cost-effective operation and maintenance (iv) Ability and willingness to pay (v) Cost-containment through improved resources utilization (vi) Sector planning and project preparation (vii) Role of WHO Note on ILO activities in CWS	
<u>OTHER (NON-PIPED) SYSTEMS (WORKING GROUP II)</u>	31
Community-maintainable water supply and sanitation (CMWSS) Ways to achieve CMWSS Role of WHO and other External Agencies	

CASE STUDIES AND TECHNICAL COMMENTS

Seven cost recovery issues in urban CWS	4
Cost recovery options for low-income urban population	5
Water demand management in cities of Kenya, Pakistan and Syria	10
Assessment of non-revenue water in Malaysia	11
Reduction of non-revenue water in Malaysia	12
Use of revolving funds in Thailand	13
Cost recovery at public standposts in Burkina Faso	14
Use of the liquidity approach in Indonesia	25
CWS accounting and commercial practices in Malawi	26
CWS organization in the Philippines	27
Cost recovery in the Philippines	28
Leak detection and repair in the Philippines	29
Financing options for piped systems	30
Aspects of community-based CWS projects	33
Community participation in Tanzania	34
Rural CWS sector organization in Tanzania	35
Joint-venture maintenance in rural CWS in Lesotho	36
Rural CWS in Kenya, Malawi, Sri Lanka and Tanzania	37
ANNEX I List of participants	38
ANNEX II List of documents	40

INTRODUCTION

The Consultation

1. An informal consultation was held at the Headquarters of the World Health Organization (WHO) in Geneva, from 5 to 9 October 1987, on Institutional Development in Community Water Supply and Sanitation (CWS). The 15 members of the Consultative Group included Mr F. Padernal, Director, Rural Water Supply, Department of Public Works and Highways, Philippines, Chairman, nine economists and engineers from private consulting firms, two CWS specialists from European universities, two representatives of the International Labour Organization (ILO), and one representative from the International Reference Center for Community Water Supply and Sanitation (IRC/CWS). Mr C. Wang, Sanitary Engineer, was designated as rapporteur. The complete list of participants is attached as Annex I.

2. In his opening address, Mr Michael A. Acheson, Manager, Community Water Supply and Sanitation Unit, welcomed the participants and recalled the objectives of this second consultation on institutional development in CWS. While a previous informal meeting, which had been convened in November 1985, had resulted in general recommendations on institutional development and transfer of resources, this second consultation dealt principally with transfers of funds. Its general objective was to recommend improvements in CWS financial management, in order to extend supplies to an increasing number of beneficiaries, generally by collecting more revenue from those already served.

3. The approach consisted essentially in analyzing case studies prepared by consulting firms from the private sector on the subject of financial feasibility of projected CWS improvements. Cost recovery methods currently recommended by consultants were discussed in relation to feasibility, equity and other objectives of governments. These discussions led to recommendations for improvements, which are to serve as support for the preparation of more detailed guidance material, and for suggestions on the future role of financing agencies and of WHO in helping governments towards the achievement of their goals.

4. This meeting in Geneva initiated a phased sequence of activities:

- exploration of ways and means to improve cost recovery in CWS, particularly in urban poor and rural areas, bearing in mind the necessity to achieve financial autonomy in the urban subsector, in order to release funds for the development of water services in rural areas and of sanitation in general: October 1987.
- review with financing agencies of project preparation, appraisal, financing and monitoring methods with regard to cost recovery aspects and their institutional correlates: March 1988.
- consultation with temporary advisers from countries of all WHO Regions, with participation of staff from Regional Offices, in order to propose a range of possible WHO positions and activities with regard to cost recovery in CWS under different assumptions: November 1988.
- preparation and dissemination of case studies and guidance material on cost recovery in CWS, support to implementation of recommendations and evaluation: 1988/89 and subsequent period.

5. The documentation available to the Consultative Group is listed in Annex II. It essentially included a wide variety of case studies contributed by

the participants, together with publications of ILO, IRC/CWS and WHO. The Secretariat had prepared a working document describing some of the issues commonly encountered in cost recovery in CWS, which is summarized below, and a tentative agenda, which was adopted after the nomination of the consultation's officials. The Consultative Group then proceeded with presentations by all members of case studies relevant to specific issues of cost recovery, and in some cases cost containment, and directly derived from practical experience. Summaries of these case studies, which covered the various issues identified in the working document, together with essential points of the ensuing discussions, are presented here to illustrate the main conclusions of the meeting. Following the review of case studies and other materials presented by the participants, two working groups were organized in order to formulate recommendations on cost recovery in CWS: (i) in piped systems (mostly urban, agency-based) - Group I, and (ii) in other systems (mostly rural, community-based) - Group II.

Summary of findings

6. The discussions and conclusions of Group I were largely dominated by a common concern that tariffs which are in principle correctly designed fail to generate sufficient cash revenue to cover cash expenditures. Such tariffs must be high because non-revenue water is high (large consumers have private supplies, leakage, wastage and under-registration are high), cash income is much less than a reasonable portion of receivables, and the economic cost of water increases in most urban areas as a result of scarcity, distance and pollution of future resources.

7. Instead of addressing these issues and endeavouring to recover past and present costs through realistic tariffs, governments and financing agencies tend to perpetuate the financial problems of CWS by promoting tariffs which are essentially geared to cover future costs. Cash flow projections based on such tariffs are of course promising, but they are worthless because in fact people do not connect, do not consume or do not pay in the manner which was anticipated. Group I formulated recommendations on different subjects including specific issues in tariff setting (e.g. for urban poor areas) and their institutional development correlates.

8. Group II developed a comprehensive strategy for cost recovery for community-maintainable water supply and sanitation (CMWSS) schemes. The concept of CMWSS implies sustainability based on ownership, and community-based operation and maintenance. The users should therefore be informed of project options and involved in planning. Cost recovery in this context is defined as full recovery of operation and maintenance costs, and partial recovery of capital costs. Group II formulated recommendations on how CMWSS can be achieved, and on how financing agencies can assist in the process.

9. As the Working Groups reported separately on their respective findings, it became apparent that it would be vain to try to merge their conclusions and recommendations into broad statements of the Consultative Group on the subject of cost recovery in general. Such generalizations would be at the expense of accuracy, as clearly there was no common strategy emerging from one Consultation, but rather one distinct approach for each one of the Working Groups (except for a common concern that the share of software -support-activities should be increased in overall investment). These approaches are therefore presented separately here.

PROBLEM DEFINITION¹

Importance of cost recovery

10. As half of the population of the developing world is still deprived of adequate drinking water supply and sanitation facilities, the provision of these services free of charge to some people implies that they will not be extended to others. In view of the current intensification of CWS development programmes, hampered by serious budgetary constraints in most countries, the issue of cost recovery from users and other beneficiaries becomes increasingly critical; it is compounded by the problem of apportioning the burden of water rates (in the absence of significant revenues from sanitation) between people of different needs and means.

Difficulty to recover full cost

11. Governments realize that the cost of water does not decrease over time, as the temporary benefits of capacity extensions are more than offset by subsequent expenditures for the mobilization of new resources; therefore the price of water cannot decrease over time. If tariffs are calculated to reflect future investment needs, they generally exceed the means of those who must have water at low cost. Now the scope for cross-subsidization is reduced as a result of the imbalance between the fast-growing low-income population and the stagnating or declining large consumers' group. Efforts to extend services towards urban poor and rural areas are often vain, because of the failure to recover the full cost of CWS in the privileged residential and industrial areas of large cities, and the resulting need to constantly subsidize those who have water.

Cost containment

12. As a companion policy of cost recovery, cost containment is thus becoming an essential ingredient of sound financial management. Institutional improvements resulting in pooling resources through coordinated intersectoral action, in reducing gaps between CWS providers and users through decentralization, or in some cases improving efficiency through privatization, can within limits be conducive to improvements in both cost recovery and cost containment. Technical improvements in preventive maintenance and overall reduction of non-revenue water (NRW = leakage in network + reservoir losses + firefighting and illegal use + meter under registration + operational use + all other unpaid water) as well as adoption of higher construction standards are sometimes called supply management, while demand management essentially consists in orienting consumption through appropriate tariff structures.

Cost recovery

13. Costs can be recovered through tariffs, which are used to channel funds from the users to the supplying agency, which in turn pays for the resources used in the provision of the service, and channels any surplus to either improve the present level of service or extend the supplies to new beneficiaries. Tariff systems can be assessed with reference to the following four objectives: equity (in relation to present users); autonomy (of the agency), efficiency (in the use of resources), and expansion (to future beneficiaries). To each objective correspond criteria against which the various concepts and methods of cost recovery should be assessed.

¹ Abstracts from working document CWS/LL/ig and participants' comments.

Seven Cost Recovery Issues in Urban CWS

(i) Impact of local politics on water tariffs: urban water and sewerage authorities are often semi-autonomous organizations whose actions on tariffs are subject to final approval by their own board of directors (which often include local politicians), local municipal/metropolitan councils, provincial governments and central governments. These political influences often result in postponement, reduction and/or cancellation of proposed tariff increases. This leads to increasing financial losses which can result in default on debt obligations, greater reliance on subsidies and a decline in the service provided. There is a need for greater political awareness that appropriately justified tariff increases should be permitted.

(ii) Supply and demand management: greater emphasis should be placed on the concepts of supply and demand management, by encouraging a policy of reduction in unaccounted-for water (leakages, illegal connections, metering and billing problems), the use of physical controls to restrict supply where appropriate, and the control of consumption through education and price mechanisms (i.e. appropriate tariff structures). Two aspects which deserve specific mention are: standards of construction (low construction standards lead to high losses) and knowledge of the water market (through accurate meter reading and regular sample surveys of household water consumption).

(iii) Adequate financing of sewerage: sewerage operations are often given low priority, and there is only a nominal charge or none at all; sewerage can impose high operating costs and often accounts for a large proportion of the financial deficit of an urban water and sewerage authority.

(iv) Improved financial planning with target setting: this would provide a more effective framework for senior managers to control the operations of the organization and for other agencies (local, national and international) to monitor performance within, say, a 5-year planning horizon.

(v) Financial problems created by foreign exchange losses and rate of return covenants: in the last 10 to 15 years, large loans from international lending agencies have created significant financial problems, as the value of the local currency declined in relative terms, and the rate of return requirements based on annual revaluations of operating assets often imposed unattainable targets on water and sewerage authorities.

(vi) Alternative sources of investment finance: sources of finance which could be explored include: equity participation from public and private sources: this implies the need for regular measurable improvements in financial performance in order to pay an annual dividend; capital contributions from beneficiaries: target groups (e.g. industry, development authorities, etc.) should have sufficient capital resources and ability/willingness to contribute (in exchange for reduced service charges over a defined period); and turn-key finance to construct and perhaps operate specific installations (e.g. water or sewerage treatment plants).

(vii) Human resources - skill availability, training and salary levels: the availability of skilled manpower at all levels is crucial for financial management and proper cost control. It requires appropriate selection procedures, training, career development programmes and competitive salary structures.

Source Comments on Working Document CWS/LL/ig, July 1987, by
M.T. Summerfield, Independent Consultant, September 1987.

Cost recovery options for low-income urban populations

The common practice of subsidizing CWS in high-income urban areas implies that less funds are available for extensions towards rural and urban-fringe zones. Steeper progressive rates in residential and industrial districts would make it possible to recover costs, leaving funds for basic CWS services in lower income areas. Indeed, until high-income urban consumers pay the cost of CWS, the rural and urban-fringe dwellers, who generally have much lower incomes, can hardly be expected to contribute to the running costs of their own services. Possible financing methods include mixed systems with standposts cross-subsidized by paid house connections, and unmetered group connections with flat or graded rates.

Group connections are particularly suitable where strong social ties already exist within small groups living close together. 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; this tends to penalize low-income households. An alternative is therefore to introduce graded rates, with households classified into rate categories, based on estimated differences in water use and income. The advantage of graded rates is that they reflect volume used and payment capacity, without having to install and read water meters. Such rates have for example been introduced in several towns in Colombia. The Puerto Asis water supply scheme provides a good example of a graded structure based on estimated property values.

A major constraint in piped systems is the high connection fee. Programmes in several South American countries and in the Philippines include connection loans enabling households to pay back the connection charge as part of their monthly water rates. Another method frequently used in low-income urban areas, particularly in Central and South America, is to give users the opportunity to do all the unskilled construction work by themselves, in exchange for a free connection or other advantages.

Selling water at standposts or through concessionaire-households can also increase revenue. However, it usually means much higher costs to the users than with yard or group connection, and the users are vulnerable to exploitation in times of water shortage. Water selling is therefore particularly indicated in special circumstances, such as when:

- a traditional vending system already exists which can be improved and provides better quality water at an acceptable price;
- a piped water supply or other appropriate water development is not feasible 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;
- a piped water supply is ruled out by political authorities, 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.

Finally, closely-knit low-income urban neighbourhoods and settlements can be assisted to set up a semi-autonomous or autonomous system in their area. Thus, user associations in Latin American cities buy their water at a metered point and distribute it with their own resources.

Source What Price Water? User Participation in Paying for Community-based Water Supply, by C. van Wijk-Sijbesma, IRC, Water & Sanitation Centre, The Hague, March 1987.
Report of the Slow Sand Filtration Demonstration Projects in Colombia, by same author, IRC, April 1982.

COST CONTAINMENT²

Intersectoral action

14. In regions which are difficult to serve, for example as a result of the coincidence of poverty of people and dispersion of habitat, the combined action of CWS and other sectors is often conducive to reductions in cost. Dispersed dwellings represent in many countries 30% to 90% of total population, and their demand may be for software rather than hardware; they are primarily in need of quality surveillance and health education, and other services based on intersectoral cooperation, particularly with agencies of Local Government, Public Health, Education and Agriculture. In this context the provision of hardware should not take place on a systematic basis, but rather be motivated by the health status of the populations concerned.

15. Intersectoral action is also required in the less-privileged districts of large cities; shortly before CWS services are extended to these areas, the need is felt by many water and sanitation agencies to obtain support from more decentralized structures such as those of the Public Health or Education sectors, in order to ensure that the future beneficiaries are adequately informed of the costs and benefits of CWS services, and that they will in the future save water and accept to pay for it. Similarly, although to a lesser extent, intersectoral collaboration can result in improvements in both cost containment and cost recovery in the residential and industrial areas of large urban agglomerations.

Decentralization

16. Decentralization can occur in the form of "deconcentration" (of the central agency towards the community) or "devolution" (of power to the community), or (preferably) both. It varies according to topographic, climatic and demographic conditions, and such physical and human characteristics often play an important role in the need for decentralization and its success. While CWS agencies have known limits to their decentralization potential, software providers such as Health agencies are usually more deconcentrated. Integration of CWS and other elements of Primary Health Care (PHC) can therefore serve as support to decentralization.

17. Devolution of authority and responsibility to self-reliant community structures with support from software providers is probably the most effective arrangement; it requires important recurrent budget increases. In many instances, even though decentralization of CWS institutions takes place, there is little increase in actual spending for the rural subsector. Financial autonomy should at least be achieved in urban CWS before decentralization can be effective: this requires a strong government commitment. Community participation provides opportunities for reducing costs in less-privileged areas. In many cases, urban services have been made more accessible to the poor through more participation, varying from voluntary labour to reduced connection costs, to operation and maintenance of group connections and standpost by user groups, and autonomous small installations such as handpumps.

Some limits to decentralization

18. Deconcentration of hardware providers is difficult, as the general scarcity of resources is compounded by logistic constraints. There appears to be a limit beyond which construction, operation and maintenance unit costs become so high as to offset the benefits of the process. Some countries have for instance

² Abstracts from Working Document CWS/LL/ig and participants' comments.

adopted a central Fund arrangement to channel surplus funds from urban to rural areas; however, the costs of deconcentrated structures may exceed the amounts thus made available.

19. As a result of attempts to transfer financial and other resources by cross-subsidy from urban to rural areas, urban consumers' contributions may become excessively high; alternatively, urban tariffs cannot be raised and the water agency may be in danger of losing its financial autonomy. Also, municipal or provincial agencies often construct and operate water supply and sanitation installations; deconcentration may be difficult or useless if the central agency overlaps with strong regional or local agencies. Finally, in most of the least developed countries, deconcentration is very limited in all sectors, because of lack of support and contact structures such as provided by provincial capitals or regional development centres, and this limits the decentralization potential of CWS.

Privatization

20. In the sequence input-output-outcome-impact, the public institutions are often seen as mostly concerned with the maximization of their inputs (e.g. their development budget) and their outputs (e.g. number of systems constructed) on which their performance will be assessed. The intention behind privatization is to further improve the output/input ratio, and to maximize outcome and impact, thereby expanding companies' markets and increasing their power. Clearly all of these objectives are difficult to achieve and can hardly be pursued concurrently by any one agency. When granted a monopoly, which is generally the case, a private water company may even be motivated by the sole objective of maximizing its output/input ratio within a reliable market beyond which it will not willingly expand its services.

Some limits of privatization

21. Matters of public interest can generally not be vested in private hands in the absence of strict regulatory mechanisms, especially in sectors like water supply which have direct public health implications. Government interventions are required to ensure that affordable services will be extended to the less privileged, that best use will be made of locally available resources, and that the company can remain viable without charging exorbitant prices to other sectors of the economy (e.g. industry or tourism).

22. Water supply agencies, whether public or private, have a very high proportion of fixed costs, and must devote the largest share of their (variable) income to meet payroll and debt-service obligations. Private companies are subject to pressures to ensure the continuity of their service. Their income structure should be such as to allow for maintenance of existing assets and for depreciation and to generate a surplus to meet service expansion needs. All of these objectives can be pursued concurrently by a public institution, at the risk of being subsidized for its operating deficit.

23. By contrast, a private company should as a priority remain creditworthy, pay its staff and maintain a satisfactory service level. Provisions are therefore required to monitor and control the activities of these private entities as well as foster their development. Alternatively, their mandate can be restricted to operation and maintenance activities, with or without commercial risk. The existence of a wide variety of standard agreements to govern the relationship between government and private companies in public utilities suggests that "privatization", despite its merits, may not be an absolute panacea in CWS, and the process should therefore be selective and carefully regulated. Some review of newly-implemented privatization methods (e.g. through leasing in Burkina Faso, or franchising projects executed by the

International Labour Office in Kenya) is also warranted, with a review of social aspects, such as why user groups and cooperatives sometimes run standposts, instead of private vendors.

Preventive maintenance

24. The premature replacement or rehabilitation of equipment which has not been properly maintained involves the utilization of scarce funds which could otherwise have been employed to extend CWS services to more people. Besides the unpredictable hazards of major breakdowns in the absence of preventive measures, the rationale for investing resources in preventive maintenance is based on expected improvements in the reliability of the supply, and avoiding or postponing lump-sum rehabilitation or new investment. Preventive maintenance also lowers recurrent costs. In developing countries, its importance could not be overemphasized in view of the gradual deterioration of water systems and the high level of NRW. The amount of preventive maintenance required varies from one system to the other. Failure to carry it out may lead to inability of a system to operate as originally designed or to work at full capacity. The need for preventive maintenance can be further justified on the premise that no meaningful waterworks expansion programme should be initiated if the existing system is not properly operated and maintained.

25. It also seems important to consider the problem of intermittent water service in small urban and rural areas. In some developing countries, most water systems operate at best 12 hours a day. This may be due to inadequate operations and insufficient capacity of the existing facilities, or resorted to in an effort to minimize pumping and energy costs and thus reduce water charges. In the latter case, this means that the system is not operating at its full capacity because the community prefers to pay minimal charges. To improve the system on the assumption that it will be operated 24 hours a day may be illusory because there is no assurance that the users' preference will change.

26. In large urban systems however, expected improvements in the reliability of the supply may provide a valid argument in favour of preventive maintenance. Tariff structures are often designed to subsidize the poor, with the expectation that large consumers can be charged higher rates; this may not happen because the large consumers' group does not grow as fast as the low-income consumers' category, or more commonly because of capacity constraints and high NRW, intermittent service, which encourage large consumers, particularly industry, to build their own private supplies.

Metering and minimizing non-revenue water

27. Indiscriminate metering in small urban systems may not solve problems which are generally related to poor operation and maintenance. As mentioned in the cost recovery options, it may be prudent to reconsider the flat or rather graded rate concept as an alternative to total metering, particularly in the case of weak institutional set-up and insufficient technical and organizational capability. In order to minimize water wastage associated with flat-rate connections, regulating devices such as flow restrictors, may be used to limit the quantity of water provided to users. In all cases, local conditions and acceptability by the community of the proposed changes should be taken into full account.

28. The high level of non-revenue water is frequently due to high physical leakage requiring improved maintenance, but also to the large numbers of defective or inoperative distribution meters and illegal connections, and to the fact that in the absence of reliable master meters, production can only be estimated, and such estimates are usually on the high side. Some of the arguments for and against metering can be summarized as follows:

- pros: increase in revenue - equity - reduction of misuse and wastage - conservation of the resource - more accurate economic costing and pricing providing signals to increase or decrease consumption - use of a single parameter (volume) - differential tariff structures according to volume consumed - possibility to calculate meaningful lifeline rates, to predict average revenue and growth in demand - improvement of the commercial and accounting organization, management and control of a public utility - better technical control of water supply systems (subject to adequate master metering).

- cons: cost (acquisition in foreign currency, installation, preventive maintenance, inspection, repairs) - consumers' reactions to defective meters (vandalism, non-payment) - irregular income (as opposed to flat rates) - high levels of under-registration and other technical problems (adaptation to local conditions) - logistic and other difficulties related to inspection and reading (on which billing and collection depend) - high level of accuracy required prior to computerization - billing system purely volumetric and impersonal perhaps not adapted to equity objectives - poor reliability of supply may be an obstacle to consumers' willingness to pay for metered consumption.

29. On the whole, metering is not in itself a cost-containment measure; it is a step which should be considered first upon starting improvement programmes designed to reduce the level of non-revenue water. NRW includes leakages in pipes, under-registration by defective meters, reservoir and other operational losses which can decrease as a result of physical rehabilitation of facilities and technical improvements. But it also includes the considerable amount of water which is consumed either illegally or because laws to regulate the use are non-existent or not enforced, and this raises a more serious problem of resources management.

Water Demand Management in Cities of Kenya, Pakistan and Syria

Urban water and sewerage authorities in developing countries are expected to provide an effective and efficient public service which meets present and future needs, and is financially self-supporting. Many of these authorities have been established within the last 10 to 15 years with the support of international lending agencies who have provided training, technical assistance and capital funds for construction works. One of the prime aims of this development was to create semi-autonomous agencies which are dedicated to improving and expanding urban water and sewerage services. The duties and functions of these authorities are often embodied in specific legislation, which includes an obligation to maintain adequate financial records and the right to levy appropriate tariffs. In most urban water and sewerage authorities, tariffs are regarded as nothing more than a source of revenue. This fact ignores their importance as an instrument of demand control and evokes significant reaction from local politicians when increases are proposed.

There are a number of cities where tariffs could and should be used more effectively as instruments of demand management and where political factors influencing the setting and approval of tariff increases should be minimized, for instance: Nairobi (Kenya); Karachi, Lahore and Hyderabad (all Pakistan); and Damascus (Syria). These cities are faced with the increasing capital cost of conveying water from sources which are a greater distance away or becoming increasingly depleted. Urban growth demands improved access to potable water and, almost inevitably, large new capital works are seen as the only solution. Some of the cities have tried to reduce the proportion of unaccounted-for water, but none have used tariffs as a means of demand control. The high cost of new construction works demands that urban water and sewerage authorities should increase their efforts to minimize the use of existing resources, including the adoption of a policy of demand management.

Political influence on the setting of tariffs is prevalent in all five cities. The inability to secure adequate tariff increases has led to increasing financial losses, and in some instances, an increase of 50% or more would be required to restore financial stability without covering accumulated debts. The interim solution has been to provide increasing subsidies and/or to adjust the capital and debt structure by converting loans to equity and debt rescheduling. However, if the objective of financial independence is to be sustained and future losses avoided, then regular realistic tariff increases should be approved.

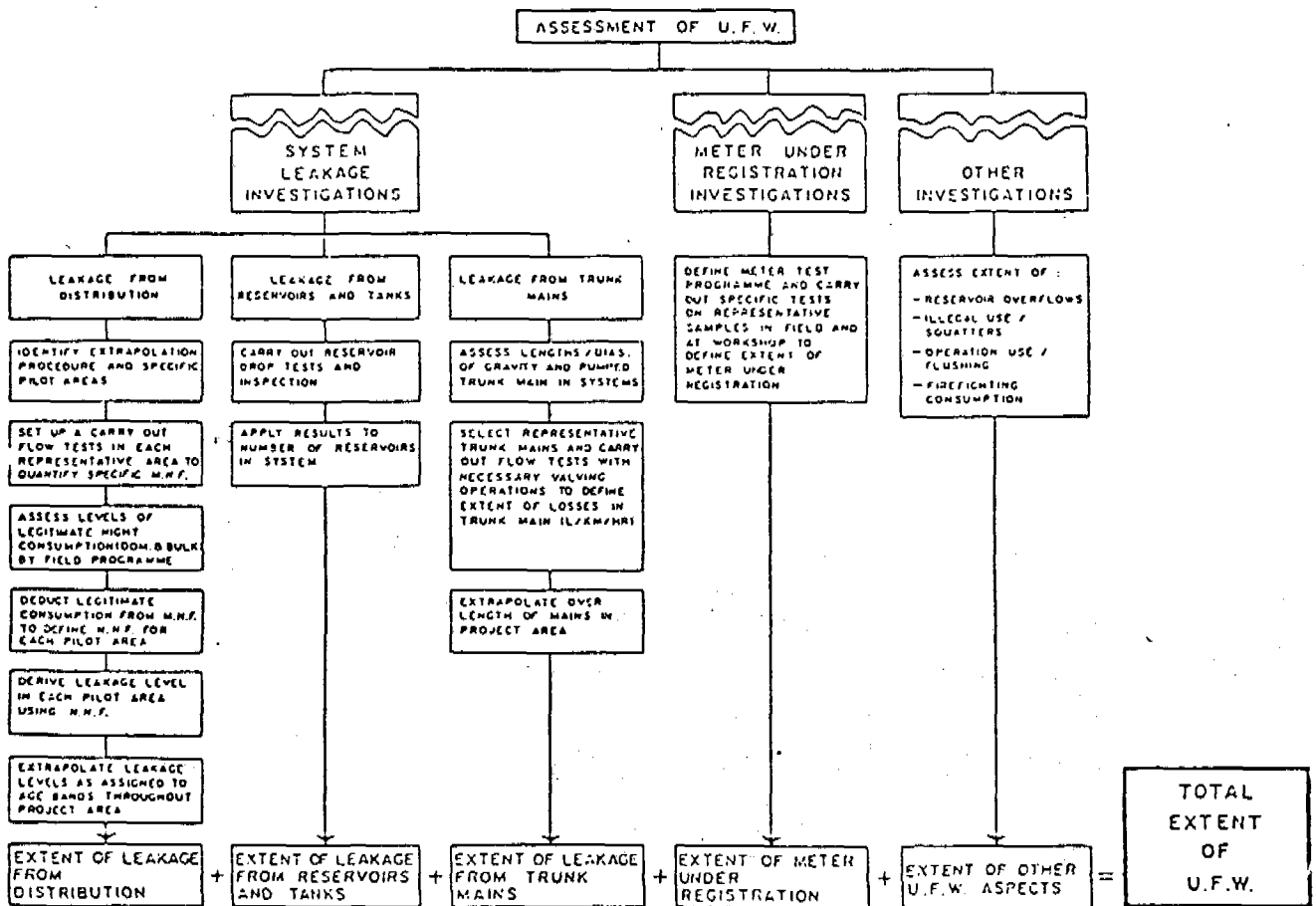
In most authorities there is no single department which combines the functions of research, planning and policy review. A possible solution would be to establish a Development Planning Unit reporting directly to the managing director or chief executive. This unit would be responsible for carrying out basic research and preparing policy documents for executive action. One of its tasks would be to study the relationship between tariffs and water demand, and to make specific recommendations aimed at controlling demand particularly in the domestic high income category. The establishment of such a unit would require training of both the personnel directly involved and the senior managers who would be responsible for implementing the unit's recommendations.

Source Tariffs, Demand Management and Political Factors, by
M.T. Summerfield, Independent Consultant, September 1987.

Assessment of Non-Revenue Water in Malaysia

Unaccounted-for water (UFW) or non-revenue water (NRW) comprises losses of water incurred by leakage, wastage (overflows), and meter under-registration. Petaling Jaya town (Selangor State, Malaysia) has developed over the last 35 years from an early resettlement area, into a large well planned overspill satellite town to the capital city of Kuala Lumpur. It is primarily residential in nature, although having a significant amount of industrial premises. The area is supplied from two regional sources, having a water production to the area of approximately 140,000 m³/day and serving a population of 250,000 through 50,000 metered connections. The total estimated NRW in the project area can be summarized as follows:

- distribution leakage	23,670 m ³ /d
- trunk main losses	2,392 m ³ /d
- reservoir losses	negligible
- firefighting	475 m ³ /d
- squatters & illegal use	3,327 m ³ /d
- operational use & reservoir overflows	negligible
- meter under registration	
(a) 24% domestic sales	15,120 m ³ /d
(b) 20% bulk sales	5,400 m ³ /d
Total estimated NRW	50,384 m³/d

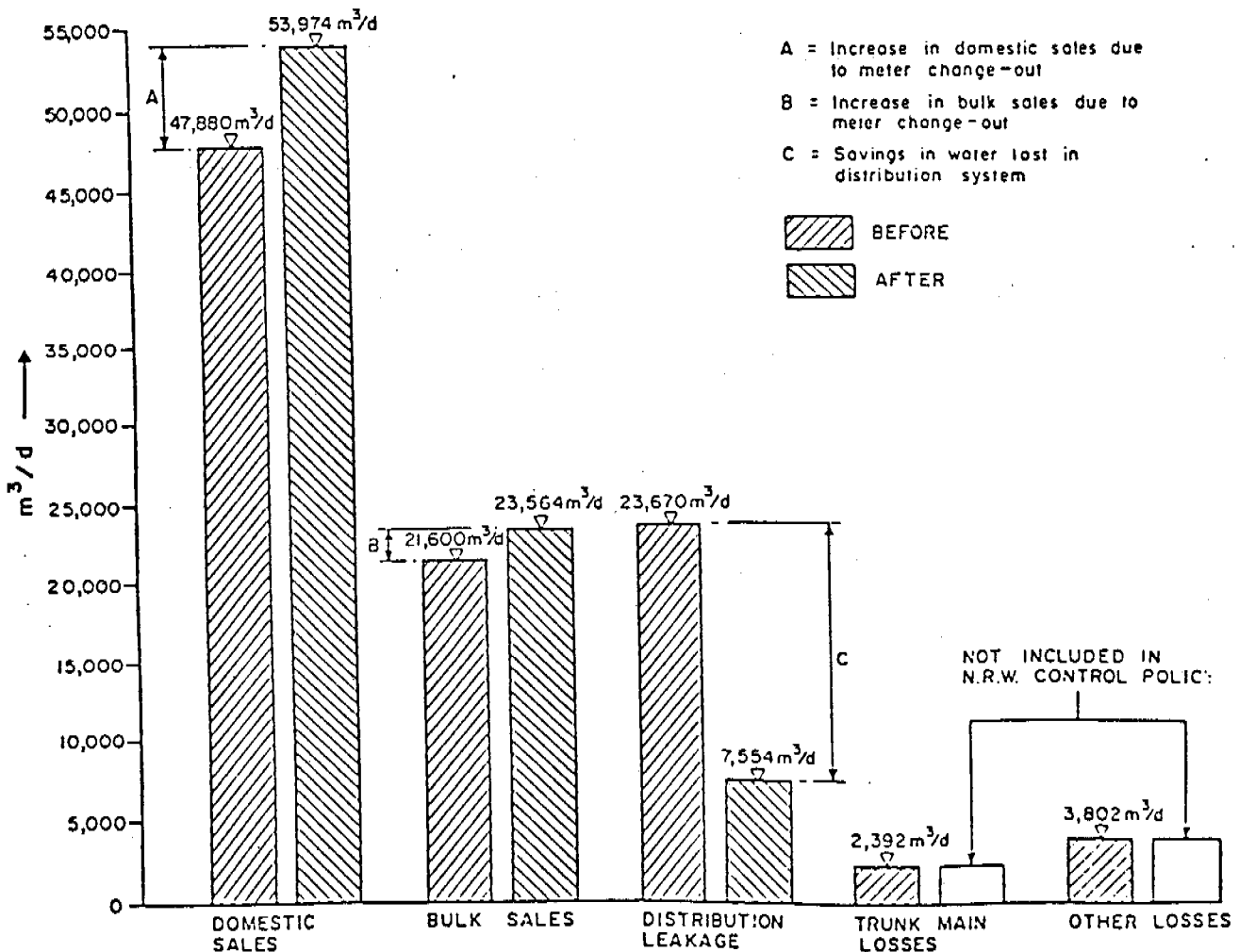


Source Petaling Jaya Non-Revenue Water Control Project, Selangor, Malaysia, by A.J. Price, John Taylor and Sons.

Reduction of Non-Revenue Water in Malaysia

The NRW Control Policy recommended for Petaling Jaya results in savings from leakage reduction and from revenue metering as direct benefits, and some indirect benefits, such as:

- increased efficiency of the supply and distribution functions;
- improved knowledge of NRW levels as a tool for management decisions;
- increased consumer satisfaction due to improved response-time in repairs and generally improved control of system pressures;
- leakage levels reduced to their optimum economic minimum by implementing combined metering control methods whilst carrying out visual inspection and sounding throughout Petaling Jaya to rapidly control NRW levels in the short term;
- maximization of amount of revenue collected, by ensuring that the metering policy is improved in terms of reducing the level of under-registration;
- increased awareness and effectiveness of staff through in-house and on the job training;
- adjustment of present organization to accommodate the NRW functions to ensure its implementation and long term effectiveness.



Source Petaling Jaya Non-Revenue Water Control Project, Selangor, Malaysia, by A.J. Price, John Taylor and Sons.

COST RECOVERY³

Equity

30. To the poor, who consume little water and have a tradition of paying high prices to vendors, for a service which is generally accepted as it is, equity is essentially related to actual qualitative improvements, easier access, and the extension of significant advantages to as many people as possible. Whether the improvement is significant or not will be a determinant of the acceptability of the proposed tariff; this willingness to pay is probably much more important than the concept of affordability. It is however generally admitted that the water/sanitation bill should not exceed a small proportion (usually from 3 to 6%) of the household budgets of the poorer people. An equitable tariff is also one which does not penalize large consumers to such an extent that it may indirectly affect the use of any national resources which would remain idle if these consumers ceased to exist.

31. In this sense, full cost recovery may be the wrong description of a sound objective. It has a financial connotation implying that the transactions which occur on the water market are limited to transfers of water in exchange for cash payments. What it actually means is that the economy as a whole should recover all of its investment in the sector in the form of health and other benefits, including cash income. In the latter sense, if water benefits everybody, everybody should pay for it, but not necessarily the same amounts, in the same manner, or at the same time.

32. The misplaced concept of free water is still in use in many countries, with politicians advocating equity and philosophers arguing that human rights to water were recognized in the most ancient cultures. Some countries also subsidize water for public use, so that governments have free water, then compensate by subsidies for revenue lost by public utilities. Water as a public commodity should be available to all. In most developing countries, where full coverage is far from attained, the supply of free water to any given consumer implies that the service will not be extended to others who have equal right to it.

Feasibility

33. Where the concept of free water has been rejected, tariff structures are designed to mobilize resources from all those who benefit from the service. It is therefore important to determine where exactly these resources are, and whether they are adequately distributed and sufficient in total to assure that revenues cover costs. Changes in fiscal or technical policies are usually costly and irreversible, and they should therefore be directed at key factors which affect income.

34. An important contributor to revenue is the fast-growing low-income / low-consumption category served by social connections or public standposts. It is often assumed that water at the standpost should be free: this is generally not feasible in the many countries where hundreds of thousands of consumers are either served by standposts, or not served, while only a few hundreds of those with private connections can be regarded as large consumers likely to subsidize others.

³ Abstracts from Working Document CWS/LL/ig and participants' comments.

35. A large share of the sector's income goes to water vendors: the less privileged consumers who do not even have standpost service often pay ten times as much for water as the clients who enjoy the benefit of a private house connection. In some countries however, water vendors are provided with a private metered connection supplying a public standpost. A concession agreement is made between the utility and the vendor, with covenants stipulating the concessionaire's maximum selling price and other obligations. Consumers pay much less than they would to vendors, and each concession has a profit margin equivalent to a reasonable salary.

36. Other solutions for low-income urban areas include group connections, cooperative standpipes, concession sales by female heads of households who have no other source of income and can also give hygiene education, and small autonomous neighbourhood systems such as handpumps. Other important contributors include large and intermediate consumers. Since a substantial part of the tariff burden can be absorbed by large consumers, it is essential for a water utility to ensure that all large meters are in working order; water rights and private supplies should also be checked.

Rules of thumb

37. In the design of an urban/urban poor tariff structure which would meet rational utility revenue objectives, the following rules of thumb may often apply: (i) the public standpost service should be financially autonomous, with an average tariff to the concessionaire equivalent to the average cost of water to the utility; (ii) the intermediate consumers' category should pay at least the average financial cost; (iii) large consumers should pay the long-run marginal cost of water; (iv) the resulting average tariff should be as close as possible to the economic value of water; and it should be sufficient to ensure that all cash needs are covered (liquidity maintenance concept).

Social and public health aspects

38. Well-designed tariff structures have three major aspects and benefits: (i) their social component allows for extension of the service to the less privileged; (ii) their progressive aspect discourages excess use and waste; (iii) they allow for gradual extension of the service as demand increases. Thus, their overall benefits in terms of public health and social welfare are threefold: (i) they help in providing equal access to a commodity which is essential to health; (ii) they help in the protection and conservation of a scarce resource, and the sharing of its benefits by a larger part of the population; (iii) they help in maintaining the continuity of the service, and expanding it to match increases in population and water demand.

Issues in rural CWS

39. A major issue concerning CWS in rural areas is the willingness of the community to accept new responsibilities in the management and operation of water systems: users may refuse to pay for water on the belief that water services should be provided free by the government. Intensive education and training programmes at community level (especially young people) are thus required, and the agency should negotiate, rather than impose the devolution of responsibility to the community, which should play a role in project planning and implementation.

40. More generally, improvements in cost recovery in rural areas require an evolution within the community, with behavioural changes corresponding to the acceptance of a new responsibility and the activation of an organization to fulfill it; because they are poor, rural communities have multiple priorities; because they are dispersed, they have difficulties in organizing themselves for

the attainment of long-term goals; as a result strong resilience is common: the community lends itself to change, then reverts to its precedent behaviour; satisfactory cost recovery schemes temporarily suspended after a disastrous harvest may never be resumed again; malfunctions of pumps may even never be reported.

41. Although it is sometimes argued that the amount which people are willing to pay for water can be used as a proxy for their demand, villagers may have very high water needs and still object to cash payments; cash income is scarce in many rural areas and there is no evidence that rural dwellers will not continue to drink water at no expense from traditional sources in order to save their cash income for the acquisition of those goods which cannot be purchased without money.

Autonomy (and privatization)

42. The autonomy objective is essentially a financial one, as it requires that the water utility operate in a breakeven situation, meaning that average tariff, or better average real income, should equal average cost, which may be limited to the cost of providing a service from existing assets to an existing clientele or extended to the cost of maintaining on a permanent basis the provision of a service, including its expansion as demand grows. This broad distinction gives an indication as to what can be delegated to the private sector and what should remain primarily the concern of government:

- where there is no anticipated growth in demand which might exceed the capacity of existing assets, the sector can be financially autonomous if tariffs cover operation and maintenance costs; a private company can be licensed to operate and maintain existing works;
- if a private company is licensed to build, operate and maintain water supply works, it will add to its tariff some proportion of the acquisition and construction costs of assets in operation;
- in a situation where demand is expected to grow continuously, the tariff should comprise not only the costs of operating and maintaining the system, but also a provision for future replacement and development costs;
- this provision is constituted by incorporating in the tariff an allowance for depreciation and a rate of return, both calculated on fixed assets in operation, not at their original acquisition or construction value, but at current replacement cost.

43. One important aspect of the objective of financial autonomy of CWS as a whole is that the water bill should be increased to provide for sanitation needs, especially for the disposal of used water. This usually results in high selling prices in this sector.

Efficiency and expansion

44. Tariffs conceived as above are likely to meet the expansion objective of the sector, by channelling towards future beneficiaries the surplus which they generate from existing facilities. They are also likely to meet the efficiency objective corresponding to an optimum use of resources from all sectors, by channelling funds to pay for these resources, at least as long as there is no distortion between their market prices and their real economic values. Where such distortions exist, tariffs should be adjusted to reflect the value of water to the economy as a whole rather than to the utility.

45. On the consumption and cost recovery side, tariffs will be both effective and efficient if they take into account the fact that most people must have water at low cost: differential tariff structures should therefore be implemented to subsidize the poor; the potential for cross-subsidies is however limited: half of all water produced is unaccounted-for: the water sector is a unique case of loss of this magnitude, and therefore provides a unique opportunity for highly cost-effective improvements.

Note on revolving funds

46. Revolving funds can contribute efficiently to expansion in domestic water supply: the model is particularly well-adapted to the specific supply/demand conditions and expansion needs of the water market. While the technical soundness of these accounting and planning methods is beyond question, their ability to facilitate expansion varies considerably between countries, with specific constraints related to high service costs, slow demand growth, and inadequacy of the sector's institutional framework.

47. If due account is taken of inflation to reflect in the cost price of water realistic depreciation allowances and provisions for extensions through revolving fund arrangements, average tariffs may become so high as to defeat the purposes for which renewal and extension funds were created. They may exceed the thresholds of consumers' ability and willingness to pay for the service.

48. Revolving funds can revolve only if growth occurs at every stage of the development process. The assumption that demand will either remain stable or grow, irrespective of price changes, may apply within limits to individual consumptions; it does not apply, however, to the collective demand of most communities, which in many developing countries will have a fast-growing low-income consumers' category. Supply limitations (e.g. intermittent systems, high levels of leakage and wastage) may also severely affect the growth and service extension potential of a revolving fund.

49. The operation of a revolving fund requires a delivery system to transfer resources from larger urban centres to medium-size towns and eventually to rural areas. Vehicles to channel such resources and structures to monitor their use are often absent or deficient, beyond the limits of decentralization of national water agencies. Centrally-managed public utilities are generally reluctant to extend their activities to small agglomerations as this will tend to lower their financial performance.

50. Where revolving funds are feasible, they have the merit of forcing the sector into a disciplined and reliable organizational framework. While they do not generate resources, they can act as catalysts and long-term regulators. They also give a better chance to agencies to break even. As long as such funds continue to revolve, the entire water supply sector can rely on their proceeds. It is however essential that governments be committed to ensure their continuous financial performance, and in particular that all surplus income generated in the sector be earmarked to ensure that revolving funds do revolve.

Use of Revolving Funds in Thailand

Village Public Health Development Revolving Funds are handled by Revolving Funds Committees at the village level, under the supervision of the village committees with subsidies and guidance from the Department of Health and Provincial Health Offices. These Funds are initially restricted to water and sanitation. The trend is to combine different funds operating in villages into multipurpose funds which have been more successful.

Depending on the committee of a particular village, the maximum amount loaned may be the full cost of a water tank or latrine, or the fund can be divided up in order to increase the number of houses served at the same time. Considerations taken into account before the Revolving Funds Committee decides to grant a loan to the applicant are: ability to repay and willingness to comply with the revolving funds regulations. The committee ensures that the money given is used for the specified purpose and in reasonable time; social sanctions also play an important regulatory role since everybody knows each other in a village.

Repayment (with interest of 1% per month) is usually scheduled into 10 equal monthly instalments. For low income applicants the repayment may be scheduled into 20 instalments.

However many villagers are farmers and receive their main income only once or twice a year, payment is therefore required after the sale of crops. Payment is always ensured by a guarantor who is also a member of the same Fund, and who pays any sum due by a participant who is unable to meet the Fund's obligations. Village sanitary craftsmen who have received training and hold membership in the Fund advise and assist in construction.

The Thai experience so far in the use of public health development revolving funds has been characterized by absence of defaulters; the revolving fund system has really helped to promote faster installation of cement jars, rainwater tanks, latrines, and other facilities; the main problems encountered have been lack of management skills and inadequate knowledge of book-keeping. The public health development revolving fund programme is operating in 18,000 villages (out of 60,000 in the country) with a total sum of about 120 million Bahts, i.e. 4000 - 8000 Bahts per village.

The Thai experience emphasizes the importance of motivation, health education, training, back-up service by Government, performance of village-level institutions and workers, revolving funds, community participation and involvement, liaison at all levels between Government and people, self-reliance, and inter-sectoral collaboration and coordination, with technology transfers.

Source Experience in Sanitary Latrine Programme, Thailand, by
Nongluk Tunyavanich, WHO/SEARO Intercountry Workshop, New Delhi,
October 1986.

Currency 1 Baht = US\$ 0,04; 1 US\$ = 25 Bahts.

Cost Recovery at Public Standposts in Burkina Faso

The urban population of Burkina Faso is supplied with water through a mix of private connections and public standposts: the cost of a private connection is equivalent to two months' salary, the distribution systems are not dimensioned to accommodate large volumes of water, and there is no sewerage system.

During the last four years, the Office National de l'Eau et de l'Assainissement (ONEA) has increased the number of standposts to 570, thereby raising to 21% the ratio of water supplied through standposts to total water consumed. During the same period, the water authority implemented a tariff structure with some income derived from sales at the standposts; these are subdivided as follows:

- 540 standposts which draw their water from the communal system; the tariff is equivalent to that applied to private connections for consumptions of less than 10 m³ per month, including a sanitation surcharge of 5%;
- 30 public standposts which are "self-supplied", in the sense that they draw water from a borehole with a diesel- or electricity-driven pump, and each has a 6 m³ water tank; tariffs amount to half of those of conventional standposts (energy costs are paid separately to suppliers).

In the early 70s, standposts were managed by municipalities, which resulted in financial problems for ONEA. Today, standpost keepers are directly linked to ONEA by contractual agreements; they are considered as ordinary private consumers, but with the responsibility to supply water to the low-income population. In Ouagadougou, some standposts are managed by associations, e.g. Union des Femmes du Burkina, or Union des Anciens du Burkina.

Due to the limited outreach of most urban water systems, especially in the capital city of Ouagadougou, water used to be bought from standposts and from some private consumers and redistributed in the periphery. Water vendors tend to become rare now that the number of standposts has increased. The maximum resale price should not exceed 150 CFAF per barrel of 200 liters. In practice, it is slightly higher, so that the average tariff from water vendors corresponds to about five times the average tariff of the connection/standpost mix, which is about 160 CFAF per cubic meter. Before 1983, the same barrel was sometimes sold at 800 CFAF (4000 CFAF/m³).

For the entire Ouagadougou system, the ONEA staff in charge of standposts comprises one cashier, one plumber/meter reader and one labourer. Each standpost keeper receives an invoice once a week; the disconnection of all standposts in arrear occurs on Monday morning, and all unpaid bills are usually recovered within three days. The weekly revenue of standposts keepers averages from 3000 CFAF to 39,000 CFAF with a medium value of 11,000 CFAF. This revenue is higher for self-supplied standposts, with a medium value of 37,000 CFAF. The revenue of water vendors is of the order of 3500 CFAF per week.

Source: Management of public standposts in Burkina Faso, by J.-P. Thevenon, Compagnie Générale des Eaux, Paris, and ONEA, Ouagadougou, September 1987.

Currency: CFA franc (CFAF) - US\$ 0.003; 1 US\$ - 302 CFAF.

RECOMMENDATIONS OF THE CONSULTATION

COST RECOVERY IN PIPED SYSTEMS (WORKING GROUP I)

General principles

51. In the discussion of the Working Group on piped systems (water supply and sewerage), the following main principles were evolved:

- water and sanitation authorities should be granted increased autonomy if they are to provide a cost-effective public service;
- the operations of these authorities should be more responsive to the needs of the communities which they serve; this requires improvements in users' consultation and market research, and effective public relations;
- greater emphasis should be placed on cost efficiency and optimum use of existing assets;
- tariff structures should provide for cross-subsidization in order to relieve the financial pressure on the urban poor.

52. The sector should be well organized and financially sound, in order to provide a service which the community is willing and able to afford. In order to justify existing and proposed user charges, cost recovery should be viewed in the broader context of providing a cost-effective service and not in the narrow sense of imposing a defined tariff. The issue of cost recovery applies equally to water supply and sewerage services. On the subjects of autonomy, participants from ILO subsequently suggested a process through which autonomy, responsibility and accountability of the CWS organizations could be built up within a reasonable amount of time. The main steps would be as follows:

- (i) training managers in the financial management, marketing of services, increasing the productivity of human resources, reinvesting in maintenance, providing a level of service that consumers will pay for, and improving billing and collections; a series of ILO packages exist on these topics; they were designed and tested to demonstrate to public utility managers how to develop a coherent strategy for progressively negotiating autonomy;
- (ii) bringing together joint ILO/WHO teams to help interested authorities start this process;
- (iii) following up on a regional basis several times a year, helping selected authorities to improve performance, and become financially sound and able to maintain their systems.

53. The Working Group on piped systems divided its recommendations and suggestions under seven principal headings:

- (i) financial and administrative autonomy;
- (ii) financial management and planning;
- (iii) cost-effective operation and maintenance;
- (iv) ability and willingness to pay;
- (v) cost-containment through improved resources utilization;
- (vi) implications for sector planning and project preparation;
- (vii) role of WHO.

(i) Financial and administrative autonomy

54. Agencies responsible for urban water supply and sewerage systems should be granted increased financial and administrative autonomy, if they are to become really effective in providing an efficient public service, free from direct political influences. These can undermine financial viability and often result in postponement of urgently needed tariff adjustments. Increased autonomy is also required if the organization is to attract adequately qualified staff with appropriate salaries and career structures as incentives to offer an efficient professional service. This autonomy should be regulated by specific legislation which should clearly define the objectives and responsibilities of the agency, and lay down the procedures of accountability to the community which it serves and to the government.

(ii) Financial management and planning

55. Greater emphasis should be placed on improved management and planning to ensure that optimum use is made of existing assets, proposed new investments are fully justified, and user charges are adequate and affordable. Effective financial planning depends on an accurate financial and technical data base incorporated in a suitable management information system. The requirements include:

- reliable and up-to-date information on: mapping of water distribution and sewerage systems; number and location of water and sewerage connections; quantities of water produced; consumption by consumers' category (available through meter records and/or regular consumer surveys); and other key indicators;
- proper commercial accounting (internal and external audit) with results available within six months of the end of each financial year;
- realistic annual budgeting;
- preparation of roll-over five-year financial plans in order to determine the tariff levels required in relation to a pre-defined maintenance and investment programme; such plans should be conceived as dynamic and not static, with annual monitoring and updating to take account of the latest changes;
- financial planning should be based on a "no profit ... no loss" target: the maintenance of cash liquidity should be the prime objective: a positive balance should be maintained between sources and application of funds; this will ensure adequate coverage of direct operating expenses, debt obligations and a contribution to capital requirements.

(iii) Cost-effective operation and maintenance

56. Annual operating costs can be divided into direct operating costs (cash) and capital costs (depreciation and interest) or expenditures (debt-service - interest + amortization of principal). In relation to direct operating expenses, the objective should be to optimize the use of existing assets so that they deliver the most cost-effective service without needing substantial capital investment. This entails effective manpower planning (with productivity targets, motivation and appropriate training), optimization of inputs (e.g. electricity consumption, chemicals, services) to minimize unit costs, and efficient maintenance planning with increased emphasis on preventive maintenance and substantial reductions in non-revenue water (unaccounted-for water-leaks, illegal connections, inaccurate meters, etc.).

57. It is recommended that the underlying causes of revenue losses be identified and addressed. This will help the authority to: identify its capital assets; understand the optimum operational performance of the system; improve operational efficiency, which is essential to ensure consumer's confidence and satisfaction; and obtain direct benefit from a non-revenue water control policy through a reduction in annual operating costs and postponement of capital works schemes. It should be a major priority of any water and sewerage authority to reduce the non-revenue water to a target level of 20% of water produced.

58. All short- to medium-term assets (i.e. those which have to be replaced within 15 years) should be revalued each year for depreciation purposes in order to build up sufficient capital funds to allow for replacement at the appropriate time. Long term assets (i.e. those with an economic life of 15 years and more) should be depreciated at historical cost to reflect effective utilization without imposing on present consumers the tariff obligations corresponding to the recovery of full future replacement costs.

59. Capital loans, particularly from international sources, should be lent to the agency on the terms negotiated by the government, and not on-lent on "harder" terms as often happens. Excessive overhead charges imposed by some central governments on loans in the water and sanitation sector should be reduced or eliminated. CWS agencies should also seek to diversify their capital structures by encouraging equity participation from provincial and central government, and seeking capital contributions from large consumers/users (e.g. industry) with whom appropriate future water/sewerage tariffs can then be negotiated.

(iv) Ability and willingness to pay

60. Tariffs should be set at levels which reflect the cost recovery targets of the organization and the community's ability and willingness to pay. They should also be reviewed annually and increased regularly to reflect increasing costs and the levels required in relation to the financial planning process. It is recommended that a stepped tariff structure should form the basis of the main charges levied on the community. This type of structure encourages consumers to economize on their use of the service and reflects their ability to pay. Differential structures should be developed for different user groups (e.g. domestic and industrial/commercial) for both water and sewerage services.

61. Ability and willingness to pay should be measured through regular consumer surveys, which would gauge consumer satisfaction with the existing service and proposed changes. Special steps should be taken to ensure that the views of women as main water users and domestic managers are investigated and recorded separately. Application of "rule of thumb" measures on ability to pay (e.g. "CWS charges should not exceed 5% of household income") can be misleading and not reflect the consumers' real willingness to pay for the service offered. Such measures should not be applied rigidly, but rather adapted on a project-by-project basis. It may be that some communities are willing to pay more than 5% to achieve substantial improvements in difficult situations.

62. CWS agencies should place great importance on proper billing and collection procedures, ensure adequate cash inflow and avoid a significant build-up in arrears which would undermine the efficiency of financial planning. They should also explore ways and means of diversifying their sources of income, e.g. sales of sludge and reuse of treated effluent in irrigation or industry, subject to adequate protection against health risks.

(v) Cost-containment through improved resources utilization

63. This section is not specific to piped (or agency-based) systems. Some of the recommended methods are outlined below:

- efficient allocation of national economic resources - the average financial price charged for the service should be equal to or close to the economic long-run marginal cost of water, which reflects the real value of the resource to the economy rather than its market value.

- consultation with users - cost recovery will be greatly facilitated if the services provided correspond to the needs and ability to pay of the users. Involvement of the community in pre-planning, planning and evaluation activities is essential to ensure users' participation in the cost recovery process.

- analysis of needs and means of the urban poor - specific attention should be given to the needs of the urban poor to ensure that the tariffs levied are reasonable and appropriate, and that they serve to optimize the consumers' use of the system in relation to what they can afford. In addition, to serve the large and fast-growing low-income urban population, there is a need to widen the range of intermediate options between paid private connections and free public standposts, and to match the needs of users with varying financial and administrative capacities. Possible options include: shared private connections and sanitary blocks serving clusters of households, metered group connections paid for by a larger user group with its own group committee, semi-autonomous systems (piped water sold in bulk to a specific neighbourhood or group which organizes its own distribution system), and autonomous systems (groups or neighbourhoods establish and manage their own community-based systems).

Where improvements are based on particular social units (varying from a single lane to large peri-urban settlements), the local consumers and their representatives should be involved in planning, management and financing decisions and activities.

64. Women are generally the main users and domestic managers of drinking water and are faced with the greatest problems in sanitation (privacy, safety, health, etc.). They can be strong supporters of both the introduction and maintenance of improved facilities. However, this potential can only be used to the full benefit if special steps are taken to involve women in project information, preparation and implementation.

65. Other recommended measures are as follows:

- health education - it may increase the willingness to pay but most water/sanitation improvements are adopted for other reasons (convenience, status, etc.). It should also be directed at men when they are the main financial decision-makers. It should not be limited to mere promotion and distribution of one-sided health messages but be based on thorough knowledge and understanding of the target groups. Mass media and community involvement can play supplementary roles.

- privatization - the agency should examine the possibility of privatizing some of its operations if this can result in a more cost-effective service. Privatization could be limited to discrete activities, such as: maintenance of machinery and equipment; treatment plant operation (water and sewerage); leak detection and repair; and billing and collection of revenue.

- complementary investment - more attention should be given to complementary investment to support the wider socio-economic objectives in the water and sanitation sector. Complementary investment programmes could include training and manpower development, public health education, water conservation, primary health care, and other programmes corresponding to the multiple uses of water.

(vi) Sector planning and project preparation

66. Sector planning should be more creative and flexible in identifying appropriate projects for support by the international community. Current sector planning is often carried out in isolation by each ministry or international development agency and only serves the needs of the particular institution. This inevitably leads to duplication and competition which is detrimental to the rational development of the water supply and sanitation sector. A more coordinated approach is warranted, which involves all of the relevant institutions in the country concerned and the interested international development agencies (multilateral and bilateral). This has implications on the coordination of financing plans and therefore on the costs to be recovered.

67. In the project preparation process, there are several important factors which should receive more prominence in the drafting of terms of reference and project specifications:

- more emphasis should be placed on market research and community participation at all stages of project preparation, through user consultations and consumer surveys, to ensure that the service offered matches the "real" demand;
- more consideration should be given to community-managed projects in low-income areas for the provision of both water supply and sanitation services as a more cost-effective method of extending coverage and providing phased improvements in levels of service;
- the effective use of local expertise and the mobilization of local resources should be encouraged;
- more effective and appropriate technical support should be provided to water supply and sanitation agencies in the form of consultancy contracts which require not only the study of a problem and preparation of appropriate solutions, but also actual implementation in an advisory capacity;
- greater attention should be paid to realistic implementation schedules, accurate project costing and acceptable standards of construction;
- the monitoring of project implementation and post-implementation performance should be made more effective.

(vii) Role of WHO

68. WHO already acts as an important forum for the exchange of views and information on the development of the water supply and sanitation sector. However, there are a number of ways in which this role could be made more effective and practical:

- promote a regular forum for exchanges of views and analyses of development in financial and management topics related to water supply and sanitation; this could be in the form of a regular journal drawing contributions from and being circulated to finance and management specialists of water and sanitation agencies and other appropriate institutions in developing

countries, international development agencies such as the International Labour Office, national and international research institutions, consultants and other interested parties;

- promote and support technical research on specific issues in the water supply and sanitation field, e.g. improvement of domestic revenue (water) meters to improve their reliability and reduce unit costs;
- prepare and disseminate information on specific technical subjects related to water supply and sanitation;
- promote in-depth research into specific topics of current interest, e.g. cost recovery, or water supply and sanitation services to the urban poor.

Note on ILO activities in CWS

69. The International Labour Office (ILO) is generally interested in the creation of employment opportunities. Currently some major areas of ILO activities are:

- SPWP - Special Public Works Programme.
- SBE - Small Business Enterprises.
- Rural development.
- Management of public utilities.
- Training.
- Environmental management.
- Cooperatives.
- Maintenance.

The issue of cost recovery is dealt with in ILO programmes, and the general policy is as follows:

- there should be autonomy of the water agency; only in this manner can financial viability be achieved;
- management should be motivated towards efficiency; the concept of financial management should be stressed;
- there should be a positive cash flow;
- there should be cultural acceptance to cost recovery;
- maintenance should be the responsibility of all involved parties.

Use of the Liquidity Approach in Indonesia

Water rate policies can be based on economic and social criteria. An example of the first is incremental cost coverage using factor prices that reflect resource shortages in the economy, while external benefits such as savings in health care are subtracted. An example of the second is provided by cross-subsidy systems. Whatever the criteria however, financial needs set limits to rate levels, and these limits are normally calculated through financial cost analysis. Cost coverage is a rough indicator that operations will not suffer from a temporary or permanent shortage of cash to cover expenditures for operation, maintenance, replacement and interest.

However, rate levels based on financial costs are sufficient only as long as the water utility can borrow as much money as it needs whenever a temporary liquidity shortage occurs. In most countries, it is neither feasible nor acceptable for water rates to fluctuate immediately and fully with cost levels; therefore, rate policies take into account a levelling out of annual changes. For such cost models to be appropriate, the water utility should deposit temporary liquidity surpluses into accounts with interest rates at least equal to rates of inflation. At the same time, these accounts should not be at risk of being appropriated by the authorities for other purposes. A third condition is that rate increases be applied in a timely manner so as to cover higher costs caused by inflation. It is well-known that such conditions are seldom met. By contrast, in many developing countries, water supply facilities are financed through very soft loans or grants, so that water rates calculated on the basis of total costs are more than sufficient for financial viability.

Because of this inability of the cost model to provide a meaningful simulation of future cash flows, the "liquidity approach" was used to prepare a feasibility study for the water system of the rapidly growing town of Bogor, West Java, Indonesia (1987 population: 650,000). Indonesian water utilities can borrow long-term funds only to increase capacity or to finance extensive rehabilitation programmes. Procedures are long and complicated. It is also very difficult to borrow to cover temporary liquidity shortages. Thus cost levels give little indication of rates needed to ensure liquidity. The financial analysis of the Bogor project started with an estimation of the minimum liquidity level at the end of each financial year, consistent with effective and efficient operations.

Taking into account the seasonal fluctuations in liquidity and the fact that at least some reserves should always be available, this minimum was estimated to be 15.5% of the total cash outflows. The rate level needed to reach this minimum liquidity level should be significantly higher than total costs, by 10 to 30%, mainly because of increases in working capital requirements and differences between assets depreciation and loans amortization. As a result of applying this rate level, net income before taxes will be 55% of total operating revenues (with depreciation based on replacement costs). Apparently, rate policies based on liquidity maintenance are easily accepted by governmental authorities who are generally used to applying cash figures rather than cost considerations when preparing their budgets.

Source Liquidity Maintenance as a Basic Criterion for the Determination of Appropriate Potable Water Rates, by H.C. Van der Mandele, IWACO, September 1987.

CWS Accounting and Commercial Practices in Malawi

In Malawi, the District Water Supply Fund (DWSF) has little information on each one of its 50 individual schemes; the financial analysis of the Fund as a whole and of six of its components about to be extended has revealed interesting distortions of the actual operational picture as a result of specific accounting practices.

The DWSF makes use of any spare capacity to construct "minor" works consisting of system rehabilitation, small extensions and in some cases the provision of water connections. The income statements of the DWSF for 1979- 85 showed an accumulated net loss of 17.5% of total expenditure, which had to be offset by subsidies: tariffs did not seem to allow the Fund to break even. However, by capitalizing the cost of some construction works, it was shown that the DWSF had been operating on a sound financial basis during the entire period. The expenditures' side of the income statement was divided to show investment-related costs separately, which resulted in reducing by about one-third those direct operational costs (including depreciation of minor works) against which water sales and other directly operational revenue should be shown.

Similarly, the DWSF balance-sheet provided a distorted image which could be prejudicial to the Fund in its relations with future financing partners. It appeared that the valuation of fixed assets at current replacement costs had not been introduced until shortly before 1979. As fixed assets invested since that time represent only a minor part of the Fund's asset base, the DWSF balance-sheet does not reflect actual replacement needs, nor does it provide a signal when the rate of return becomes unrealistically low. It also results in a high debt/equity ratio, which provides an unfavourable picture for future borrowing. A more realistic approach consists in reevaluating the DWSF asset base as a whole. The resulting effect of increased charges can be alleviated by using a depreciation method based on arithmetically progressive allowances.

Since the future extensions will be combinations of the existing six schemes with new works, it has been found useful to break down the output of DWSF together with its production cost, into each individual system's account. This showed in particular that two of the planned schemes would operate at a loss (unless tariffs were raised) while the four others were profitable. Since water is a public service, it has been considered reasonable to cross-subsidize the loss of unprofitable schemes by applying a common national tariff to all centers. Within this national tariff, it was recommended to freeze the life-line tariff, and let large consumers cross-subsidize smaller ones. It was also noted that many households could not afford a private house connection, even though they could pay the subsequent charges, and it was therefore recommended to subsidize the cost of house connections for this consumers' category.

Source: Accounting as a tool for financial management and cost recovery in CWS programmes, a case study by D.K. Wyss, Societe Generale pour l'Industrie, September 1987.

Currency: Malawi Kwatsha (MK) = US\$ 0.45; 1 US\$ = 2.23 MK

CWS Organization in the Philippines

The 40,000 barangays (basic administrative units) of the Philippines are provided with three levels of water supply service depending upon the community's ability and willingness to share in costs and the responsibilities. Level I is generally a protected well with a handpump, or a protected spring; level II is a communal standpipe system; level III is a piped system with individual metered connections. Sanitation facilities range from latrines (levels I and II), to septic tanks (level II), and to installations connected to septic tanks, or to conventional sewerage systems (level III). Various institutions are involved, and there is some overlap at each one of the three levels.

The cost recovery scheme of the Metropolitan Manila Waterworks and Sewerage System (MWSS) is based on the principle of financial viability. Tariffs are calculated to cover all operation and maintenance costs including depreciation, and to meet debt-service requirements. The combined water and sewerage tariff averaged PS 3 per m³ as of October 1986. It is multiplied by a coefficient of 1.6 to account for charges for sewerage and environmental protection. The combined water and sewerage charges generally do not exceed 2% of the household budget of low-income families. New water connections are installed free of charge. Like private connections, public standposts are metered and their consumers pay a tariff based on domestic rates.

The other urban centres of more than 20,000 inhabitants are served by the Water Districts (WDs) which are assisted by the Local Water Utilities Administration (LWUA). The WDs are required to be financially self-reliant. Water tariff structures are calculated to ensure that low-income families do not pay charges in excess of 5% of their income. The financial viability of LWUA depends primarily on the capability of WDs to meet their debt service obligations. Loan repayment efficiency of the largest WDs has considerably declined in recent years, resulting in a chronic cash deficit; this is due in some cases to low water rates, and in other cases to inadequate water service resulting in low sales volume.

The Rural Water Works Development Corporation (RWDC) is the main institution in the rural subsector, where financing terms are different for each service level, with government subsidizing nearly entirely level I facilities as well as the source development works for level II systems, while associations of community members (RWSA) pay the full capital cost of distribution networks for level II systems, and the entire cost of level III systems. For level I systems, the water charges cover only minor repair and maintenance costs and normally range from PS 1 to PS 2 per month. In many cases, these fees are not collected. For level II systems, monthly charges are set to cover the amortization of the loan for the construction of the distribution system, the depreciation of pumps and motors, the monthly electric consumption and other operation and maintenance costs including salaries and wages. The monthly charges range from PS 22 to PS 25 per household, or about 2 to 3% of the monthly income of a poor family. Water rates for level III systems are intended to cover all operating and debt servicing costs and allow for reasonable profit; the tariff structure is such that the larger consumers provide a cross-subsidy to the smaller ones, as that the poor pay less than 5% of their income for water.

Source: Community Water Supply and Sanitation in the Philippines, by G.E. Montrone and R.A. Giusto, Carlo Lotti & Associates, August 1987.

Currency: Peso (PS) = 0.05 US\$; 1 US\$ = 20.4 PS

Cost Recovery in the Philippines

Since it started operations in 1980, RWDC has shown low collection efficiency. As of the first quarter of 1986, the amounts collected represented 28% of billings at level II and 38% at level III. There are about 1000 level II systems in the country which have not been paying any debt service as a result of the absence of loan documents.

In order to encourage all families to install household toilets, the Department of Health provides toilet bowls free of charge; the families install them with their own resources, under the guidance of trained sanitary inspectors. Community inputs include the digging of the toilet pit, provision of the superstructure, wooden platforms and pit linings, and are estimated to have a value of about 50% of the total unit cost of the project.

The level of non-revenue water is high everywhere (50% average during the last 17 years, 65% in early 1977 in metropolitan Manila). The financial viability of MWSS will probably be improved after construction of the recently approved extension of distribution facilities, which should increase revenue by about 25%; however, it remains dependent on the outcome of the on-going rehabilitation project, which is expected to reduce non-revenue water to a low level of 25% in 1990. The financial viability of LWUA is dependent on that of WDs; most small municipalities cannot pay the interest costs of LWUA loans, although these have recently been reduced to about 10%. LWUA is therefore unable to service its own debts to the Government, and does not obtain new Government contributions to equity. As to RWDC, a serious problem facing the rural programme is the failure to incorporate as financing source a credible amount of local equity, without which the water systems continue to be viewed as free gifts from the Government, and the community's involvement is much less than anticipated in terms of maintenance and debt-servicing.

A very high proportion of the rural population can afford the water charges for level I systems, and a good proportion can afford level II systems; very few rural communities can afford to pay for level III systems. Besides, the willingness to pay is substantially lower than the estimated ability to pay: poor families are generally not willing to pay a water bill amounting to 5% of their monthly income. The difficulty resulting from the reluctance to repay loans is compounded by the strong desire of most communities to enjoy the benefits of a high service level.

One of the issues that the new Government of the Philippines is currently addressing is the difference in water rates between various systems; consumers within LWUA service areas generally pay a higher price for water than the metropolitan Manila consumers or those in the rural areas with a level III system. The price paid in some areas serviced by LWUA can thus reach more than 3.6 PS per m³, while in the same consumption brackets Manila consumers pay 2 PS per m³, and level III consumers of rural areas pay less than 2.4 PS per m³.

Source: Community Water Supply and Sanitation in the Philippines, by G.E. Montrone and R.A. Giusto, Carlo Lotti & Associates, August 1987.

Currency: Peso (PS) = 0.05 US\$; 1 US\$ = 20.4 PS

Leak Detection and Repair in the Philippines

Even intensive leak detection and repair programmes may not result in postponement of new construction works. While experience shows that in developing countries, leakages represent a substantial portion of non-revenue water (NRW), which generally exceeds 50% of total water production, there are some doubts that vigorous leakage detection and repair programmes can effectively reduce leakages.

In the Philippines, for instance, where leak-detection and repair programmes have been undertaken in Manila and other urban areas, there has been no significant reduction in the level of NRW after three years of implementation. In some instances, the NRW has even increased as a result of the leak detection and repair programmes because higher system pressures caused new leaks in the pipes.

When leakages account for a large portion of the NRW, leaks are generally not concentrated in some particular areas, but are found in the entire distribution system, including house connections. If so, leakage may be due to any or all of the following main reasons: old age of pipes; low quality of pipes and fitting materials; poor handling, laying, bedding and joining of pipes during construction; lack of proper construction supervision; and use of inferior workmanship and materials in installing house connections.

Under these conditions, leakages may develop due to the reduction of strength of pipes, or their inability to resist the water pressure in the network. In this case, a leakage detection and repair programme will provide only a temporary solution since the consequent increase in pressure will result in new leakages in the system until pressure and pipe strength are again in balance. Therefore, the programme may prove to be a waste of both time and money when massive replacement of pipes is the only long-lasting solution.

This type of programme should not be carried out in systems where operational practices and preventive maintenance are inadequate for lack of either technical skills or funds. Ironically, many poorly operated and maintained water systems have even been expanded, resulting in increased water losses and general waste of resources. This has given some weight to the opinion that as much as 50% of all investments for water supply in developing countries worldwide are lost within a period of less than three years.

It is therefore imperative to detect the causes of leakages prior to the implementation of any leakage detection and repair programme and to ascertain that the water agency has the technical and financial capability to carry out efficiently the operation and preventive maintenance of the system, and can strictly enforce existing laws and regulations regarding unauthorized and illegal water use. These should also be preconditions to any expansion of existing water systems.

Financing options for piped systems

<u>What?</u>	<u>When?</u>	<u>What for?</u>	<u>Who organizes?</u>	<u>How?</u>
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	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 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 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 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 subcommittee	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 paid operators, women's groups of 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 paid operators or socio-economically appropriate concessionaires, e.g. women heads of households	
coin-operated taps	not recommended because of their great sensitivity to breakdown and interference			
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

Source: What Price Water? User Participation in Paying for Community-Based Water Supply, by Christine van Wijk-Sijbesma, IRC, Water & Sanitation Center, The Hague, March 1987

OTHER (NON-PIPED) SYSTEMS (WORKING GROUP II)

Community-maintainable water supply and sanitation (CMWSS)

70. Community-maintainable point-source water supply facilities, and low-cost, on-site sanitation schemes meet felt needs and are sustainable. Sustainability inherently implies both a strong sense of ownership and an operation and maintenance (O&M) system that functions, i.e. community-based O&M, management and financing. Spare parts are usually supplied from outside but should be paid for by the community. For CMWSS schemes, cost recovery is defined as full recovery of all operation, maintenance and repair costs, and partial recovery of capital costs (in cash, kind or labour).

71. In communal water supply and low-cost sanitation, the community's share of capital costs can represent a major or minor portion of the total required investment in materials and labour. In whatever form this share is defined, it must be seen by the community as being a meaningful contribution to the project. As to individual latrines, the individual family's share should represent a major part of the total required investment. Materials given without health education and a genuine desire to have a latrine will not produce any long-term benefit. The balance of investment-related costs should be considered as a one-time grant by Government and/or the donor agency. Financial recovery of replacement costs should be established as an objective, even if perhaps not immediately attainable.

Ways to achieve CMWSS

72. The following should be emphasized during project planning and implementation:

- meaningful community involvement is required in the planning and decision-making processes; this includes providing the community with full information related to possible alternatives, with costs, advantages and disadvantages;
- cost recovery can be made a condition to assistance;
- community commitment should be demonstrated before project construction activities are commenced; the community should also show awareness of its commitments in the framework of the project;
- operation and maintenance considerations should be incorporated in all phases of the project cycle, especially in project formulation, planning and initial implementation phases;
- qualitative and quantitative service levels should be acceptable to the community;
- technology should be suited to local needs, conditions and resources;
- health education, with emphasis on improved personal hygiene and environmental sanitation, should be an integral part of any CWS project;
- increased women's involvement is required, especially in decision-making, and CMWSS management and administration activities;

- performance-related training and human resources development are required both within the institutional structure and at community level;
- the completed facilities should be formally handed over to the community;
- periodic follow-up and support services (e.g. monitoring, backstopping support, refresher training, etc) are required;
- management and implementing staff selected and retained for projects should understand and advocate the above principles;
- all necessary resources should be allocated and actions taken to ensure that activities related to the above concerns are effectively carried out.

Role of WHO and other External Agencies

73. External agencies can assist in the development of CMWSS by:

- advocating and emphasizing the crucial importance of appropriate, sustainable projects in their dialogues with Governments;
- advocating and emphasizing that women can only play meaningful roles in CMWSS projects if women's information and involvement activities are given funding and priority;
- assisting Government, if and as required, in the development of project plans that emphasize meeting of felt needs and achievement of sustainability;
- appraising projects on their potential to meet felt needs and be sustainable;
- requiring Government's agreement to CMWSS principles as a condition for assistance;
- accepting that achievement of CMWSS takes time -- for awareness creation, education, organization and decision-making;
- accepting that achievement of CMWSS is a human-oriented, not hardware-oriented, process, and basing assistance (in the form of priorities, action and funds) on this important distinction;
- supporting activities (both construction and support) that lead to the achievement of sustainable CMWSS schemes;
- allowing and accepting greater flexibility in project plans, time frames and budgets, through necessary adjustments, mid-course corrections and new support activities;
- requiring that project activities be monitored and evaluated using indicators, data and observations that reveal how well felt needs and sustainability criteria are being/have been satisfied; further, the community should be involved in the evaluation process.

Aspects of Community-based CWS Projects

In the pre-implementation phase, special effort should be made to identify and select, through community participation, the alternative which is appropriate in terms of type and technology, i.e. compatible with the available resources and which, in any case, will be perceived by the community as a definite improvement from the existing situation. Preference should be given to options implying maximum use of available local materials and equipment. The involvement of communities in every step of the process and the fact that a normal project covers the implementation of a package of many subprojects, imply a large amount of flexibility in the project cycle procedure.

The community should formally commit itself to:

- participate in the pre-implementation phases of the project cycle, i.e. express explicitly the need for an improvement of the present situation; be aware of the possible basic alternatives and the consequent burden on the community itself; agree on the type and location of the facilities;
- contribute to the implementation phase through a mixture of labour, local materials and/or cash; however minimal, this contribution is essential to engender in the community a sense of ownership;
- take direct responsibility of (or pay) for operation and maintenance of the facilities (in some cases gradually);
- make financial contributions for the replacement of equipment (this is often regarded as a longer term objective);
- timely appoint the community members who will be entrusted with operation and maintenance, so that training can be organized.

Government should be committed to:

- provide on a grant basis the investment cost for the development/improvement of facilities (in addition to contributions from the community);
- promote the favourable response of the community to the project by explaining the short term (better quality, higher reliability, easier access, etc) and long term (reduction of health hazards, etc) advantages;
- monitor the community's involvement during the project;
- explain the proper operation of the facility and the best use of the water made available, including utilizations for non-drinking purposes;
- train the appointed community members in the maintenance and repair of the facilities and in simple accounting procedures;
- set-up the necessary support structures (spare parts supplies, technical advice, quality monitoring, etc).

Community Participation in Tanzania

Shinyanga Region, in North-central Tanzania, is severely affected by adverse drought conditions. There is a general lack of water, and mortality rates among children are high.

A socio-economic survey based on visits to ten villages selected as representative of the 67 agglomerations located in the two divisions of Negezi and Kishapu, provided the following information on the felt needs of villagers, their willingness to participate in and finance water supply improvement activities, community administration and organization, and previous village involvement and experiences in self-help projects:

- men sell water which they collect from the river and transport by back or oxcart for as much as Tsh 10 (US\$ 0.15) per bucket of 20 liters;
- in communities where improved water supplies are constructed, villagers revert to traditional water sources as soon as improved water supplies do not function, or when traditional sources are more convenient or yield better-quality water than improved sources, or when the price charged for water from improved sources is considered high;
- only in some villages are women well organized, well informed, and represented on village committees;
- there seems to be high community willingness to participate in water projects, at the initial planning and decision-making stages as well as during implementation; women especially express the desire to be more organized and to participate more actively;
- villagers are generally positive to the concept of village-level operation and maintenance, assuming that proper training can be provided;
- women generally are not involved in the collection, management and use of village funds; they usually feel outside the system and are concerned that collected monies are not being used as efficiently as they could or should be; some women express the need for better accountability of village funds;
- separate meetings with village women seem to be an excellent and desired means to discuss projects; male village leaders support such meetings, and are in fact helpful in arranging for them;
- there is a preference for "mixed" water committees including trusted men and women of the village; in some cases they are integrated with village health or welfare committees;
- there is little or no appropriate community-level training for village water committee members and technical personnel;
- according to responsible village officials, obtaining contributions for "sensible" projects, such as water, is no problem; ability to pay is taken into account when contribution levels are set; contributions are collected from all working persons between the ages of 18 and 50; a cashier trained in bookkeeping is found in every village; village funds are banked under the name of the village, with different accounts for different projects; the Village Cashier is responsible for all cash transactions related to all projects, and presents reports at monthly Village Council meetings.

Source: Shinyanga Region Water Development Feasibility Study, by Clifford Wang, Norconsult, September 1987.

Currency: Tanzanian Shilling (Tsh) = US\$ 0.015; 1 US\$ = 69 Tsh.

Rural CWS Sector Organization in Tanzania

The concepts underlying the approach recommended in Tanzania for the Negezi and Kishapu Divisions (Shinyanga Region) rural water supply project were as follows:

- water supply facilities should be small, localised, and capable of being operated, maintained and financed at village level;
- the community should be involved in planning and design of water supplies to the maximum extent possible, i.e. community views re: siting of water points, washing slab design, etc., should be taken into account wherever possible. Further, during initial organisation and planning meetings, the community should be informed of available options, costs of different alternatives, etc., so that it is aware of advantages, disadvantages, costs and consequences associated with various possible solutions;
- the community should be organized and demonstrate its firm commitment to village ownership principles before construction materials are allocated and technical work actually commences;
- that people use traditional sources should be accepted and incorporated into project activities (e.g. providing training and limited materials to line open dug wells and install/improve lead-away drainage), rather than ignored;
- coverage should be complete in a few pilot villages, rather than scattered supplies being provided in many different villages. For example, it is better to install six handpump-equipped shallow wells and improve two dug wells in one single village, than to install ten demonstration shallow wells (or improved wells) in ten different villages. Only in this manner can real health impacts be made, measured, and ultimately, effectively demonstrated;
- that livestock watering will always be a priority, and always take place no matter what the felt need for safe drinking water, should be recognized and dealt with. Where there is potential danger of competition for, or contamination of, improved domestic water sources by animals, the means with which to construct separate livestock watering points (e.g. watering troughs, etc.) a safe distance away from the domestic source should be provided;
- health education should accompany all phases of community development and technical assistance work;
- project implementors and villager beneficiaries should be supported through the provision of appropriate, performance-oriented training (initial and refresher).

Source: Shinyanga Region Water Development Feasibility Study, by Clifford Wang, Norconsult, September 1987.

Joint-venture Maintenance in Rural CWS in Lesotho

The construction of village water supplies in Lesotho is a joint venture between government and communities: villagers agree to form a Village Water Committee and to contribute free labour during construction, and cash for maintenance; government and donor agencies provide all the capital costs of construction and the technical expertise; system design is based on simplified construction techniques and quality materials to ensure long life and minimum maintenance; once constructed, the water supply belongs to the villagers who are responsible for security, operation, and maintenance; the institution responsible for assisting the community during construction, Village Water Supply (VWS), continues to support the village.

Recently a policy was designed to recover 50% of maintenance costs; identifiable direct costs are transport, cost of crew time spent in villages making repairs, spare parts, materials and supplies; a service charge is added. M. 38,000 can thus be generated annually to partially reimburse the annual maintenance outlay of VWS. The villages' share of maintenance costs will be collected, and funds for systems' maintenance will again be allocated by government to VWS.

Cooperation between government and the village has been effective during the construction phase of water supplies and can be extended to keep these facilities in good working order. By joint venture maintenance, each party agrees to undertake certain responsibilities.

The obligations of the Village Water Committee will be to organize and provide free labour as needed to assist the repair crew; to pay the cost of repair including a minimum service charge for each repair request; and to pay VWS crew labour costs for the time spent in the village repairing the breakdowns.

The obligations of government will be to allocate maintenance funds to VWS to cover the entire budgeted requirement, and to open a revenue account for VWS maintenance for the collection of payments from villagers.

The obligations of VWS will be to guarantee each new system constructed for a period of one year, repairing any breakdowns at no charge to the village; to employ technically trained personnel in sufficient numbers to adequately respond to requests for repairs; to continue to train village water minders so that dependency on outside assistance can be reduced; to maintain necessary tools and equipment to meet the maintenance needs; to maintain an inventory of spare parts and supplies to meet repair needs; to pay for the transport to and from villages of maintenance and repair crews; to cover all administrative and overhead costs associated with maintenance; and to upgrade facilities to cover major repairs costing over M. 500 and to pay the total cost of rehabilitations through capital funds provided by government with support from donor agencies.

Source: Policy Paper on Recovery of Systems Maintenance Cost, Lesotho, a Case Study by L. Kraysenbühl, Institut du Génie de l'Environnement, EPFL, Lausanne, 1985.

Currency Maloti (M.) - US\$ 0.49; 1 US\$ - 2.03 M.

Rural CWS in Kenya, Malawi, Sri Lanka and Tanzania

On the basis of cases from Kenya, Malawi, Sri Lanka and Tanzania, a study of the major CWS development constraints and "alternatives for transferring responsibility to recipients" gave the following indications:

- operation and maintenance together with logistics proved to be the most severe constraints as seen by both the governments of the developing countries and by foreign experts;
- the governments regarded the lack of trained personnel as a very severe constraint; the foreign experts brought up the acute problem of cost-recovery as well as management- and effectiveness-related issues;
- lack of training as such is probably not the most severe constraint; more attention should be paid instead to the relevance of training syllabi and to the capacity of the national institutions to manage all the necessary activities;
- although the low-cost technology approach is now accepted by all parties, in practice many sophisticated schemes are still constructed;
- in spite of the lack of water resources in some areas, research efforts remain insufficient;
- the high number of agencies and projects also creates other constraints resulting from difficulties in coordination and standardization;
- the success of methods to overcome constraints is largely dependent on the efficiency of cost recovery.

Many rural schemes, upon completion of construction, fail to provide service to communities, or they become difficult to operate and maintain due to inefficiency or the lack of suitable management systems. Partly because international support was available, most developing countries have until recently concentrated on constructing new schemes. If most of the schemes constructed were maintained and kept operative, many developing countries would not have any funds for new investments.

It is likely that the governments in developing countries have avoided the gap in sector development only because most of the water schemes were not operative. Thus there is an urgent need to develop methods for cost recovery to increase local funds. Although many investments have been financed by donors, it is uncertain whether they would also be willing to pay for operation and maintenance. If they are, one could ask whether there is any sense in that kind of support in the long run, considering the ultimate self-reliance goal of developing countries. As a key policy matter it is evident that the decision by some developing countries to supply water to all people free of charge should be reconsidered and at least partial cost recovery encouraged.

Source: Towards Cost Recovery in Rural Water Supply in Developing Countries, by T.S. Katko, Tampere University of Technology, 1987.

LIST OF PARTICIPANTS

Members of the Consultative Group (and Working Groups)

Dr R. Boland (Working Group II)
Consultant, International Labour Office (ILO)
Geneva, Switzerland

Mr C. Caprez (Working Group I, alternating with Mr D. Wyss)
Water Supply Project Manager, Société Générale pour
l'Industrie (SGI), Consulting Engineers
Geneva, Switzerland

Mr I. Cummings (Working Group II, alternating with Dr R. Boland)
Senior Management Adviser, Management Development Branch
International Labour Office (ILO)
Geneva, Switzerland

Mr T.S. Katko (Working Group II)
Research Officer, Tampere University of Technology (TUT)
Tampere, Finland

Dr L. Krayenbühl (Working Group II)
Chief Training Officer
Ecole Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland

Dr G.E. Montrone (Working Group II)
Director, Carlo Lotti and Associates, Consulting Engineers
Rome, Italy

Dr F. Padernal, Chairman of the Consultative Group (Working Group II)
Director, Project Management Office for Rural Water Supply
Department of Public Works and Highways
Manila, Philippines

Dr C.J. Pendley (Chairman, Working Group II)
Sociologist, Kampsax-Kruger, Consulting Engineers
Kandy, Sri Lanka

Prof. R.J. Price (Working Group I)
Director, John Taylor and Sons, Consulting Engineers
London, UK

Mr M.T. Summerfield (Chairman, Working Group I)
Independent Consultant in association with Balfours (Consulting
Engineers) and Howard Humphreys (Consulting Engineers)
Cheam, Surrey, UK

Mr J.-P. Thevenon (Working Group I)
Senior Financial Adviser, Compagnie Générale des Eaux (CGE)
Paris, France

Dr H.G. Van der Mandele (Working Group I)
Senior Economist, IWACO, Consulting Engineers
Rotterdam, the Netherlands

Drs C. Van Wijk (Working Group I)
Research Officer, International Reference Centre for Community
Water Supply and Sanitation (IRC/CWS)
The Hague, the Netherlands

Mr C. Wang, Rapporteur of the Consultation (Working Group II)
Sanitary Engineer, Norconsult, Consulting Engineers
Oslo, Norway

Mr D. Wyss (Working Group I)
Head, Water and Rural Development Department
Société Générale pour l'Industrie (SGI), Consulting Engineers
Geneva, Switzerland

Advisers and Observers

Mr A. Creese, Economist, SHS/NHP, WHO, Geneva
Mr D. Drucker, Sociologist, Consultant, CWS, WHO, Geneva
Dr I. Hespanhol, Sanitary Engineer, CWS, WHO, Geneva
Dr M. Jancloes, Medical Officer, HSC, WHO, Geneva
Ms M. Phillips, Economist, Consultant, SHS/NHP, WHO, Geneva
Mr A. Rotival, UNDP/WHO Decade Coordinator, EHE, WHO, Geneva
Mr M. Suleiman, Sanitary Engineer, CWS, WHO, Geneva

Secretariat

Mr M. Acheson, Manager, CWS
Mr L. Laugeri, Financial Analyst, CWS
Secretary of the Consultation
Mme I. Bartholomeau, secretary, CWS
Ms S. Sinan, CWS
Ms H. Stiff, CWS

Themes of Working Groups

Working Group I Cost recovery in piped systems (water/sewerage)
Working Group II Cost recovery in other CWS installations

LIST OF DOCUMENTS

1. Shinyanga Region Water Development Feasibility Study, by Clifford Wang, Norconsult, September 1987.
2. Towards Cost Recovery in Rural Water Supply in Developing Countries, by T.S. Katko, Tampere University of Technology, 1987.
3. Management of Public Standposts in Burkina Faso, by J.-P. Thevenon, Compagnie Générale des Eaux, Paris, and ONEA, Ouagadougou, September 1987.
4. Experience in Sanitary Latrine Programme, Thailand, by Nongluk Tunyavanich, Intercountry Workshop, WHO/SEARO, October 1986.
5. Tariffs, Demand Management and Political Factors, by M.T. Summerfield, independent economic and financial consultant in association with Balfours (Consulting Engineers), UK, and Howard Humphreys (Consulting Engineers), UK, 1987, with comments on Working Document CWS/LL/ig.
6. Liquidity Maintenance as a basic criterion for the determination of appropriate potable water rates, by H.C. van der Mandele, IWACO B.V., October 1987, with comments on Working Document CWS/LL/ig.
7. Accounting and Financial Analysis as a tool for Tariff Policy and Cost Recovery management in CWS programmes, a case study by Dominique K. Wyss, SGI Consulting Engineers, September 1987.
8. Study of High Cost of Construction and Water Production in some Countries of the WHO Eastern Mediterranean Region, by S. Bishara, WHO/EMRO, February 1986.
9. Petaling Jaya Non-Revenue Water Control Project, Selangor, Malaysia, by A.J. Price, John Taylor and Sons, 1987.
10. Community Water Supply and Sanitation in the Philippines, by G.E. Montrone and R.A. Giusto, C. Lotti i Associati S.p.A., Rome, August 1987, with comments on Working Document CWS/LL/ig.
11. Republic of Sri Lanka, Maintenance of Handpump Operated (modified MARK II) deep Tube Wells, Cost Estimate, by C.J. Pendley, Kampsax-Kruger, 1987; with comments on Working Document CWS/LL/ig.
12. Policy paper on Recovery of Systems Maintenance Costs, Lesotho, presented by L. Krayenbühl, Institut du Génie de l'Environnement, Ecole Polytechnique Fédérale de Lausanne, 1985.

13. What Price Water? - User Participation in Paying for Community-Based Water Supply, by Christine van Wijk-Sijbesma, IRC, The Hague, March 1987.
14. Flexible Learning Package and other ILO publications (distributed during the consultation).
15. Abstracts from Comparative study of Water Tariff Structures (India), by V. Venugopalan and T. Nandakumar, Ministry of Urban Development, India (WHO/SEARO, September 1986).
16. A Study of the Vendor Water Distribution System in Surabaya (Indonesia), by M.S. Suleiman, July 1977, and other WHO publications.
17. Planning Document CWS/LL/ig, June 1987.
18. Working Document CWS/LL/ig (Draft), July 1987.
19. Provisional Agenda and List of Participants, List of Documents CWS/LL/ig, September 1987.
20. Institutional Development in CWS: Case Studies and Issue Papers (WHO/CWS/85.5)
21. Tariff Structures in Water Supply (WHO/ETS/82.2)
22. Institutional Development in CWS (2 volumes, WHO/CWS/86.9 and 86.10)
23. Water Development funding (World Health, December 1986)
24. Water for All: Who pays? (WHO Forum, under publication)
25. Report of the Technical Discussions on Economic Support for National Health for All Strategies (A40/Technical Discussions/4), WHO Geneva, May 1987.

= = =