Operational Paper

Appropriate pricing and cost recovery in water services

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ABSTRACT

The viability of water services is still constrained by inadequate cost recovery, especially in developing economies. This paper reviews and analyses recent issues and international experiences from water pricing policies and practices. Full cost recovery (FCR) is becoming a recognised policy objective in industrial economies, although irrigation water tariffs are often subsidised. In developing economies water tariffs are generally below the economic cost of water, and tariffs are not adjusted regularly. Case studies from Kenya and Zanzibar illustrate the importance of an appropriate policy environment and institutional arrangements. The main factors contributing to poor economic performance of water utilities are highlighted. Water utilities in developing economies need more management autonomy.

Key words | cost recovery, financing, water pricing

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INTRODUCTION

Not more than a decade ago the policy of free water was still largely applied, especially in developing countries. Inadequate cost recovery was the most severe constraint in water supply. In the 1990s water policies gradually acknowledged cost recovery and appropriate water pricing as an element of service viability. The key elements of appropriate pricing are benefits and costs, predictability of consumer contributions, water tariffs, and fee collection and financial management. The low income of water utilities in developing and transition economies and their potential revenue base should lead to improved tariff setting and revenue collection. However, water tariffs have declined in many countries in real terms. Rural areas, in particular, have lacked appropriate institutions for developing cost recovery strategies.

Water was officially acknowledged as an economic good only in the early 1990s. The earlier view of water as a public and social good made it necessary to subsidise public water supply systems heavily. Even nowadays water prices and tariffs are universally below the full cost of supply. Subsidies for specific groups, particularly people living in poverty, are required in some countries. However, viable water services require cost recovery based on the specific conditions of each country.

METHODS

The paper starts with an analysis of water infrastructure financing, pricing policies and practices related to financially viable operations of water utilities. International comparisons are mainly based on studies carried out recently by the OECD, the European Union and the World Bank.

Empirical findings are based on field data from two cases of Finnish development assistance: (1) Western Province, Kenya and (2) Zanzibar, Tanzania. The economic performance of selected community- and ministry-managed piped water supplies in Western

Province, Kenya was assessed in 1995–96 (Rämö *et al.* 1997; Hukka 1998) and later by the Kenya-Finland Community Water Supply Management Project (1997–2001). The first author carried out additional comparative analyses in the field in October–November 2000 (Seppälä 2000). The case study on Zanzibar is based on the first author's experiences and analysis of the economic and financial viability of the four urban water supplies (Zanzibar town and Wete, Chake Chake and Mkoani towns in Pemba) in 1993–96 (Seppälä 1996).

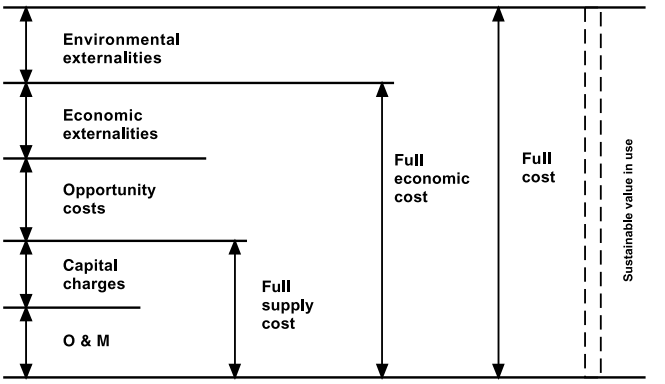

Figure 1 | Elements of the cost of water (modified from Rogers *et al.* 1998).

RESULTS AND DISCUSSION

Water infrastructure financing constraints

Inadequate financing is a major constraint on the development of new, and rehabilitation of existing, water infrastructure. Annual investments in water infrastructure, mainly in the developing countries, should be increased from USD 70–80 billion to about USD 180 billion to attain the service coverage targets up to 2025 (GWP 2000; *Vision 21* 2000). Just the financing needs of operation, maintenance and rehabilitation of the existing water infrastructure exceed the currently available resources.

For instance, Kenya is estimated to need a total of about USD 350 million over a 10-year period for water supply. The annual development and recurrent budget of the responsible sector ministry is about USD 17 million, which means that only about 50% of the required financial resources are available through the public sector budget (Seppälä 2000).

Although the lack of financial resources is a major constraint on the future development of the water supply and sanitation (WSS) sector, availability of financial resources alone will not solve the problem. Other major constraints that require serious attention are the following:

- Weak sector institutions and poor incentive environments.
- Inappropriate pricing policies that are not conducive to long-term sustainability.
- Insufficient appreciation of the role of effective demand in the investment process.
- Difficulty in devising charging structures and mechanisms that are effective in generating resources but also protect the interests of the poor.
- Lack of suitable financial intermediaries to facilitate funding of large-scale investments.

Costs of water, pricing policies and tariff setting

Improved water allocation and conservation can be achieved by appropriate water pricing mechanisms. Thus, water pricing has become a very essential policy tool (Dinar & Subramanian 1997). In theory, a water pricing system where charges are equal to the marginal costs of providing the water services will allocate resources most efficiently. In practice, deviations from the marginal cost pricing principle are common. Water prices, effluent charges and incentives for pollution control should be determined according to the principle of *full cost of water* (Figure 1). Tariffs should match the costs of supply (i.e. capital and O&M costs), but also include opportunity costs, social costs, and economic and environmental externality costs (Bhatia *et al.* 1999; OECD 1999*a*). Water prices should be based on both *economic and environmental efficiency* and *broad (social) equity* goals (OECD 1999*b*).

The term *full cost recovery* (FCR) means that water charges recover all economic, environmental and resource

(opportunity) costs of the provision of household water services. The term *full financial cost recovery* (FFCR) is used when only financial costs are recovered. It is difficult to evaluate environmental costs on a monetary basis. OECD (1999*a*, pp. 163–164) presents definitions of the factors of FCR price taxonomy and cost and revenue classification for FCR measurement in different cost-recovery scenarios. Many OECD countries have already adopted FCR as an operating principle, but very few countries actually base their household water pricing systems on the FCR principle.

In estimating the value of water, societal objectives of poverty alleviation and food security must be considered. Pricing mechanisms are an effective control and management tool and can substantially affect the market and demand for services. Customers' interests must be taken into account in water pricing policy. Customer-based approaches are essential in (i) contributing to water policies, (ii) facilitating successful implementation, and (iii) making the policies socially and politically acceptable (EU 2000*a*). Development of sustainable water charges requires public involvement, which will make citizen sounding boards or other participation more common in future. Water charges will become more closely linked to demand-side management programmes (Chesnutt 2000).

In addition to *transformation (production) costs* of water, *transaction costs* related to the provision and production of water services should be included in the economic externalities of the cost of water. Transaction costs affect the cost and pricing of water services significantly, especially in cases where service production is delegated to a private service provider (Seppälä *et al.* 2001).

Irrigation water tariffs have often been heavily subsidised at the cost of other water users. Since irrigated farming is perceived as a means of promoting social and economic development objectives, water prices are often set according to the profitability of each irrigated crop, rather than the actual costs of providing the water for irrigation purposes. According to OECD (1999*a*), several countries already apply FCR principles to their irrigation infrastructure. This is important since about 70% of global water use goes to irrigation.

The importance of appropriate pricing of water and cost recovery is nowadays widely recognised also in developing countries. There are several approaches and methodologies for water tariff setting to ensure appropriate cost recovery. The most common elements of the tariff structure include: (1) a connection charge, (2) a fixed (recurring) charge, and (3) a volumetric charge based on consumption.

Allocation of costs and revenues remains essential in tariff design, because it addresses the issue of what costs should be paid by which customers. Cost allocation becomes more intentional, requiring analysis of who causes various service costs and how. Tariffs should cover historical costs while reflecting future cost consequences. Pricing that embeds real and avoidable costs will become common (Chesnutt 2000).

Metering, billing and revenue collection

An efficacious water-pricing scheme, installation of meters, and provision of proper regulatory and economic incentives to users are important for proper water services management. Yet, real success and viability depend on proper enforcement of charges and monitoring of users, as pointed out by Bhatia *et al.* (1999). Appropriate and effective billing and revenue collection are equally important for cost recovery.

Metering makes it possible to apply marginal cost pricing. The decision to apply metering is based on perceptions about the optimal pricing structure. This depends on balancing the economic, environmental, and social criteria (OECD 1999*b*). The costs are usually the main argument for not installing meters in developing countries. Modern water meters are sensitive to water impurities, which causes O&M problems. Metering is often regarded as conflicting with social equity goals. A balance should be found between economic efficiency, environmental aspects and equity objectives. The application of household water metering continually increases, especially in industrialised countries but also in transition and developing economies. Yet, household metering should be applied where it is feasible, not as an obligatory measure.

Public water utilities in developing countries have been inefficient in water metering and revenue management. The private sector has increased its involvement through metering, billing and revenue collection contracts. With appropriate price regulation, this could be a feasible alternative for many utilities. Billing and revenue collection have been problematic especially in rural areas.

International comparisons

Water pricing policies and practices vary significantly. Mere comparison of water prices per cubic metre is misleading due to the share of fixed costs and different levels of consumption. Comparisons should rather be based on annual per-capita or per-household bills (Kraemer & Piotrowski 1998). Despite the difficulties, a general comparison is made here in three main categories: (1) industrial economies (IEs); (2) transition economies (TEs); and (3) developing economies (DEs). Various recent studies have compared water prices and documented water pricing reforms (Dinar & Subramanian 1997, 1998; Kraemer & Piotrowski 1998; OECD 1999*a*,*b*; Dinar 2000; EU 2000*a*,*b*; BIPE 2001). Countries and utilities have different reasons for charging for water, including cost recovery, redistribution of income, improvement of water allocation, and water conservation. The most common configuration for pricing combines a fixed basic charge and a variable tariff component based on volumetric consumption. The share of fixed charges should not exceed 30% of the total, otherwise the benefits of metering control will be lost. Fixed charges vary greatly, reflecting countries' different objectives in charging for water. Volumetric charges for urban and agricultural water use are relatively similar in most countries.

Industrial economies (IEs)

Public water supply pricing structures, for instance in the EU, cover a range from conservation-oriented increasing block tariffs (Italy, Spain, Portugal, Greece) to predominantly flat-rate systems (most of the UK). In Ireland, there is no domestic water price, and domestic water services are directly financed through the general taxation budget (EU 2000*b*). Many IEs nowadays combine fixed basic charges and volumetric pricing components. In volumetric charging, the trend is from decreasing block tariffs to increasing block tariffs (OECD 1999*a*). In privatised water utilities, and utilities where water services—or at least billing and revenue collection—have been arranged through private providers, tariffs seem to have increased relatively faster than the real cost of producing water.

In many IEs water and wastewater charges reflect well the full cost of water; they even generate some excessive net profit for the utility (OECD 1999*b*). In Finland most large urban water utilities adopted a water-pricing system during the last decade that made the earlier used 'hidden taxation' more visible. Although these municipal utilities originally aimed at reasonable cost recovery, nowadays many of them earn excessive profits for the owner organisations. Tariffs are not always based on full cost recovery but on the need to subsidise other public sector activities or to finance activities of the municipal central administration. However, newly enacted legislation in Finland (2001) aims at keeping the public utility profits reasonable. In any case, the profits of the private service providers would be higher.

Transition economies (TEs)

Water pricing policies in transition economies (TEs) rarely integrate economic and environmental efficiency objectives. Tariff levels are often too low to give a clear signal to users. In the Eastern European transition countries cost recovery has been poor, but several countries have adjusted tariffs during the last few years. Water pricing plays a key role in future water policies of the countries that are looking for accession to the EU.

Especially in transition economies, increasing block tariffs are applied for environmental reasons. Although they aim at economising water consumption for economic reasons, they also have a social component. Increasing block tariffs are also called conservation tariffs or social tariffs. The economic advantages of supplying larger quantities of drinking water are limited or even absent. Decreasing block tariffs should therefore be avoided (Achttienribbe 1997).

Developing economies (DEs)

Application of sound economic and environmental principles to water pricing is difficult due to affordability and social concerns. Central government owned and managed water utilities are not able to revise tariffs to reflect cost escalation. This is mainly a political issue and only to a lesser degree caused by inadequate ability and willingness of the customers to pay for increased tariffs. In developing economies the poor are typically not connected to the water system, and they pay much higher prices for water from private vendors and resellers.

Ever since their independence, many DEs have experienced a strong decline in water tariffs in real terms. In Mozambique, which gained independence in 1975, water tariffs were not adjusted until 1985. A dramatic decline in real water tariffs was experienced in Kenya and Tanzania (Katko 1991). Table 1 gives a comparison of water prices in selected countries.

Case study 1: Western Kenya water supplies

The Western Province of Kenya has a population of about 3.4 million (the country's total population is about 30 million). The Finnish Government has assisted in the development of water services in the Western Province since the early 1980s. More than 3,100 point-source water supplies and about 20 community-managed piped water supplies have been constructed, and about 40 piped water systems rehabilitated. There are a total of about 80 piped water systems in the Western Province serving about 1.5 million people. Urban water supply coverage is about 60–70% and rural coverage 40–50%. According to the new water policy, the Kenyan government aims at handing over the management of piped water supplies to communities in rural areas and to municipalities in urban areas.

Community water supplies can, in principle, set their own water tariffs, but they have to be approved by the water ministry. In practice, community water supplies apply similar tariffs as government systems. Since 1971 Kenyan water tariffs for public water systems have been adjusted only six or seven times. Water tariffs in Kenya have undergone a number of structural changes. The tariffs include different components such as a minimum charge, a non-volume based monthly (basic) charge or monthly meter rental charge, and a consumption charge. Figure 2 shows the development of water tariffs in Kenya over the long term, including recent tariffs from the Western Province. Adjusted to 2000 price levels, the tariffs have declined almost continuously until the late 1990s.

Table 2 shows some basic indicators for three selected ministry water supplies based on data collected in 2000 (Seppälä 2000). Revenue collection efficiency was low (21–66%). Collected revenue covered only 8–37% of the annual operating expenditure of the three selected ministry schemes (Table 2). In Busia district, the ministry-managed piped water supplies (10) were able to cover only 20–34% of their annual expenditure with the collected revenue. Revenue collection efficiency was 73–78% (collection of the billed revenue). (Seppälä 2000).

Although the cost and financial data of both community- and ministry-managed water systems are fairly unreliable, the following main findings were made based on the studies carried out (Rämö *et al.* 1997; Hukka 1998; Seppälä 2000):

- The economic and financial performance of both community- and ministry-managed systems is poor. The economic performance of the ministry schemes is even worse than that of community schemes. There were no improvements in the situation between the studies done in 1995, 1998 and 2000.
- Billing and revenue collection was poor. In community systems 70–90% of potential revenue was billed and 60–80% of billed revenue collected. In ministry systems only 20–40% of potential revenue was billed and 70–90% of billed revenue was collected.
- Total revenue per unit should be 2–50-fold to break even. The average potential revenue could cover operating expenditure and nearly all capital costs of the ministry schemes, but the main problem is inefficient billing and revenue collection.
- Only a few of the community systems ($n = 32$) could cover their operation and maintenance costs with collected revenue. In the case of ministry systems ($n = 43$), collected revenue covered only 5–70% of operating costs.

Table 1 | Comparison of water prices in selected countries (modified from Dinar & Subramanian 1997, 1998; Kraemer & Piotrowski 1998; OECD 1999*b*; Dinar 2000; EU 2000*b*; BIPE 2001)

			Drinking water prices EUR/m^3		Average annual water bill EUR/year	
Country	**Source**	**Year**	**Range**	**Average**	**Per household**	**Per capita**
Belgium	5,7	1999		1.80		
	9	1999		1.14		
	6	1997	2.31–2.77			
Denmark	4	1993	0.13–0.84	0.41	n.a.	28.12
	6	1997		3.57		
England/Wales	4	1995	0.51–1.43	1.48	138.05	58.80
	9	1999		1.11		
	2	1995			160.14	
Finland		2000		0.76	252.30	
	6	1997		3.10		
France	4	1994	0.06–1.86	1.02	132.94	53.69
	9	1999		1.14		
	2,3,6	1997	0.40–2.90			
Germany	4	1996	0.92–2.02	1.46	130.38	71.58
	9	1999		1.75		
	2,3,6	1997		1.90		
Italy	4	1992	0.10–0.67	0.36	112.48	38.35
	9	1999		0.70		
	2,3,6	1996	0.16–0.92			
	7	1999		0.43		
The Netherlands	4	1995	0.41–1.30	1.38	173.84	69.02
	9	1999		1.14		
	6	1997		3.55		
Spain	4	1992	0.01–1.28	0.20	n.a.	n.a.
	9	1999		0.49		

Table 1 | *Continued*

			Drinking water prices EUR/m^3		Average annual water bill EUR/year	
Country	**Source**	**Year**	**Range**	**Average**	**Per household**	**Per capita**
Estonia (Tallinn)	7	1997		0.13		
Kenya	8	2000	0.18–0.36			
Zanzibar	1	1995	0.09–0.18			
Tanzania	2,3	1996	0.07–0.27			

1, Seppälä (1996)
2, Dinar & Subramanian (1997).
3, Dinar & Subramanian (1998).
4, Kraemer & Piotrowski (1998).
5, OECD (1999*b*).
6, Dinar (2000).
7, EU (2000*b*).
8, Seppälä (2000).
9, BIPE (2001).

- Low tariffs were the main reason for inadequate revenue. On average, capital costs accounted for 45–60% of operating costs.

Inadequacies in billing and revenue collection, especially with ministry systems, are related more to inefficient billing, meter reading and accounting management than poor collection itself (Rämö *et al.* 1997). In the case of government systems, the collected revenue goes to the Ministry of Finance and only partly returns to the utilities, which discourages billing and revenue collection.

Revenue from the operation of schemes should cover fully at least recurrent costs (O&M costs) of both ministry and community schemes. Revenue records of the community schemes are not adequate for estimating the total revenue collected by them. The potential total revenue for the Western Province could be about KES 49 million per year, implying that revenue could realistically cover O&M costs (Seppälä 2000). Yet, because the ministry-managed and other public schemes keep only a part of the revenue they collect, it has been impossible for them to cover their O&M expenditure with available revenue.

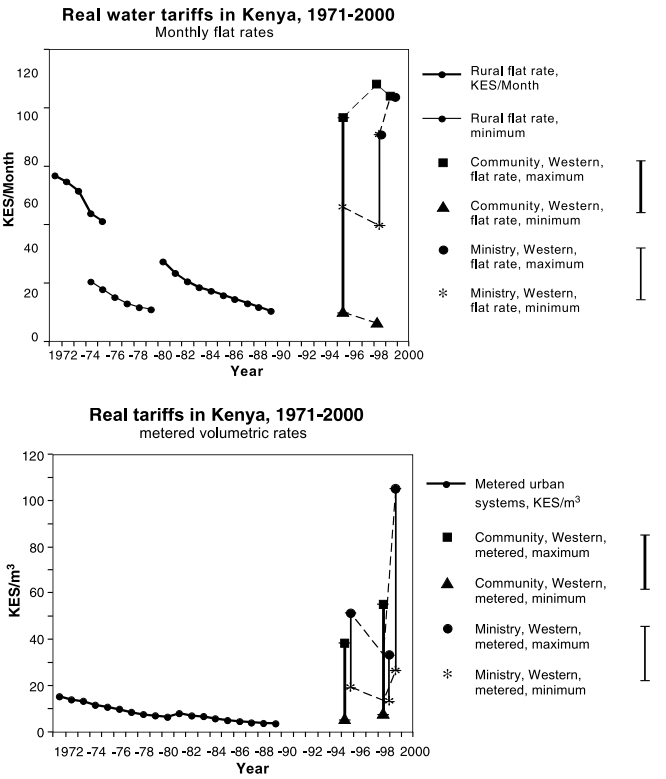

Figure 2 | Real water tariffs in Kenya 1971–2000 (modified and updated from Hukka *et al.* 1992). (a) Monthly flat rates; price level 2000. (b) Metered volumetric rates; price level 2000.

Table 2 | Basic indicators for three selected ministry water supplies in Western Kenya (Seppälä 2000)

	Name of water supply		
Parameter/indicator	**Kibichori-Bokoli**	**Little Nzoia**	**Sosiani**
Population served	16,200	n.a.	20,000
Annual O&M costs (KES/a)	1,076,640	1,218,000	1,308,900
Annual water production (m^3/a)	520,800	1,164,000	151,400
Annual water sales (m^3/a)	494,400	1,090,100	150,300
Water tariff (1997–98):			
KES/m^3	n.a.	12–15	n.a.
KES/month	90	90	90
Expected/billed revenue (KES/a)	420,000	2,079,300	480,000
Collected revenue (KES/a)	91,800	445,560	318,400
Revenue collection efficiency (%)	21.9	21.4	66.3
Collected revenue as percentage of annual O&M costs	8.5	36.6	24.3

Case study 2: Zanzibar urban water supplies

Zanzibar urban water supplies cover Zanzibar town on Unguja Island and Wete, Chake Chake and Mkoani towns on Pemba Island. The estimated populations of these towns in 1996 were: Zanzibar 224,000, Wete 24,000, Chake Chake 20,000 and Mkoani 9,000. The projected population growth in the urban areas is about 3.8% annually.

Zanzibar water supplies started to experience severe financial and viability problems due to economic difficulties in the 1970s and 1980s, and urban population growth. Urban water supply started to deteriorate after the government declared free water for domestic customers in 1981. Domestic customers that previously paid for water were then exempt, and only commercial and industrial customers had to pay for water. Government institutions were also exempt from payment. The revenue base of commercial and industrial customers was too narrow for adequate cost recovery, especially on Pemba. Over 90% of the revenue came from Zanzibar town and less than 10% from Pemba. The annual water revenue in 1991–1995 from industrial and commercial customers in Zanzibar town was about TZS 6 million (EUR 7,200). It covered only 2–3% of the operation and maintenance costs.

During Finnish assistance (1990–96), the majority of the O&M costs were covered by donor funds. After 1996 O&M activities were largely neglected due to unavailability of funding. This led to a vicious circle of reduced revenue due to customers' unwillingness to pay for their water because of poor and intermittent service. Thus, in Zanzibar the core problem was related to water policy development. Water policy and services have always been an extremely political issue. In 1996 the government decided to increase tariffs for commercial and industrial customers, but to continue supplying domestic customers free of charge. As a consequence, the Finnish project was discontinued in 1996.

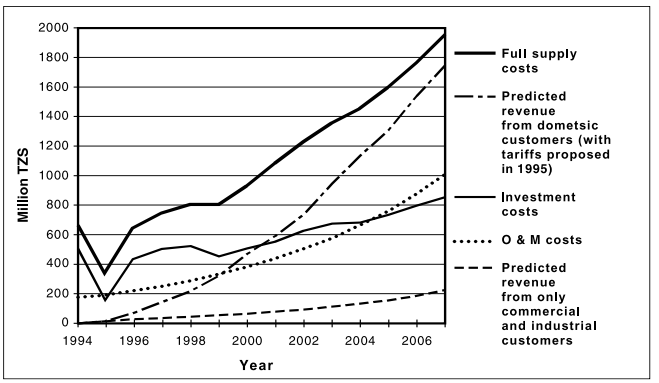

Figure 3 | Predicted trends of Zanzibar town water supply costs and potential revenue in 1994–2007 (modified from Seppälä 1996).

The real (marginal) costs of water were calculated in 1995 (Seppälä 1996). A revision of industrial and commercial tariffs and initial tariffs for domestic customers was proposed. The revised tariffs were not approved, but higher tariffs were applied to new customers such as tourist hotels. The proposed domestic water tariff based on full economic cost pricing was 200 TZS/m^3 (EUR 0.24/m^3). Yet by early 2001 no domestic charges had been levied.

Figure 3 shows the hypothetical trend of annual costs and revenues in Zanzibar town. Cost figures are based on the investment and operation and maintenance expenditures required to ensure adequate service. Hypothetical revenue figures are based on (i) predicted commercial and industrial user charges, and (ii) potential domestic customer revenue according to the project's recommendations. The figure shows how O&M costs could have been recovered based on the proposed domestic tariffs by the year 1999, if the required policy decisions and proposed improvements in revenue collection had been implemented. Full financial cost recovery (of O&M and investment costs) could have been achieved by 2007.

The majority of domestic customers, even in low-income categories, indicated a willingness and ability to pay, provided that the water service would be operational. Expectations for water policy and pricing reforms became optimistic again before the most recent elections in 2000. The high hopes were supported by Williamson's *crisis hypothesis* and *honeymoon hypothesis* on auspicious timing of policy reforms (Dinar 2000). Unfortunately, the elections further increased political tension, and water policy reforms have to wait for another auspicious time.

Even if pricing reforms were to be implemented in the case of Zanzibar urban water supplies, substantial cross-subsidies would be required from (i) urban to rural water supply and (ii) from Unguja to Pemba, to cover at least the operation and maintenance costs. Zanzibar water supply cannot reach self-sufficiency without institutional restructuring that merges urban and rural water supply. A merged water authority in Zanzibar (urban and rural) would then be seen partly as a social measure to finance rural water supply. Cross-subsidies would increase urban water tariffs above the proposed domestic water tariffs. Yet these would be reasonable compared to the average income level. The minimum sufficient tariff level (about EUR 0.24/m^3) would, however, cover no more than the full economic cost of water.

Lessons from the case studies

Although the customers' ability to pay is considerably lower in Kenya and Zanzibar than in industrial economies, water charges could be substantially increased. Charges should initially reflect the actual full supply cost of water, gradually also the full economic cost and finally the full cost of water. In the long run, customer charges are the only sustainable way of covering the costs of water system operations. Contrary to earlier beliefs, higher water charges in developing economies can improve equity. An increase in service efficiency as a consequence of raising the prices to those customers that are currently served could lead to an increase in water availability to the currently non-served population. Any reform that raises water charges, improves cost recovery, and generates funds for expanding and improving existing water systems, will be socially equitable even if charges to served customers are raised. In developing economies, the poor and non-connected people served by vendors pay a much higher price for water than those connected.

Table 3 | Water tariffs and water charges as a proportion of monthly household income in various countries (aggregate affordability)

Parameter	Unit	Zanzibar	Kenya	Finland	OECD average
A. Current average water tariff (excluding wastewater charges)	EUR/m^3	0.09–0.18	0.18–0.36	0.76	0.97
		70–150 TZS	15–30 KES		
B. Hypothetical average water tariff to cover Full Economic Cost of water (FEC)	EUR/m^3	0.44	0.54	0.72	1.17
C. Water bill as an estimated proportion of monthly income					
(a) With current tariffs	%	1.2–2.5	1.3–2.7	0.8	0.7
(b) With hypothetical FEC-tariffs	%	3.6–8.0	3.5–7.0	0.8	1.6

Table 3 summarises water tariffs and affordability in the case study countries and some reference countries. The data from OECD countries is based on *aggregate affordability*, which relates the average water charges to either average household income or to average household aggregate expenditure (OECD 1999*a*).

Affordability problems are likely to increase as countries move towards full cost recovery. In the EU countries, the present expenditure on water services is 0.3–1.2% of household income (EU 2000*b*). With full cost recovery, this would increase to 1–3% of household income. Affordability is a major issue in transition and developing economies. In developing countries, the poorest may spend as much as 50% of their income on water. Some institutions recommend that households should not have to spend more than 4% (threshold value) of their income on water services (EU 2000*b*). Yet this is rather controversial and such threshold values should not be applied categorically.

Key elements of sustainable financing and cost recovery in water services

Brikke & Rojas (2002) have divided the key factors contributing to cost recovery in the context of community-managed water supply systems into seven main categories:

1. Setting a strategy
2. Improving willingness to pay
3. Optimising costs
4. Establishing clear financial responsibilities
5. Setting an appropriate tariff
6. Improving access to alternative finance
7. Organising effective financial management

Based on the findings of this paper and Katko (1991), Figure 4 illustrates the key elements of sustainable

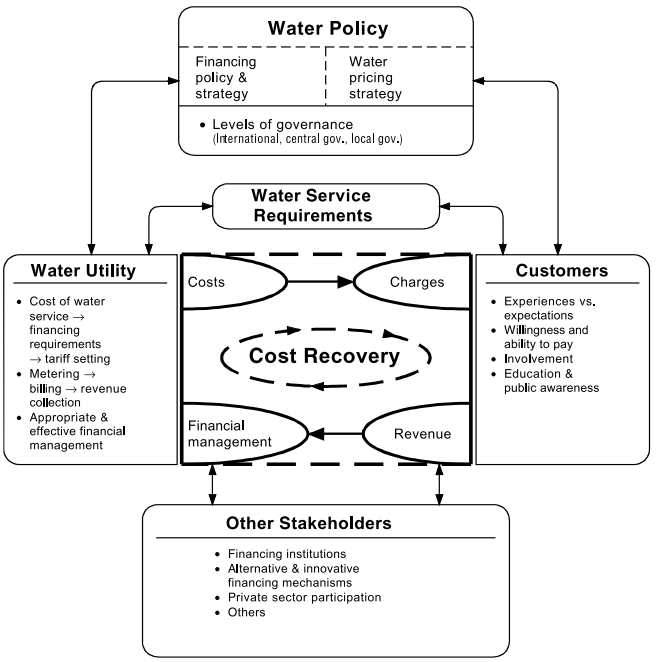

Figure 4 | Key elements of sustainable financing and cost recovery cycle in water services.

financing and cost recovery in water services. Adequate cost recovery can only be achieved through stakeholders' clear understanding of their roles and responsibilities. Otherwise, enforcement and implementation will not succeed even if policies and strategies are appropriate in principle.

CONCLUSIONS

A prerequisite for viable water and sanitation services is that all costs arising from the service must be covered, either by water users or by the general public revenue or the public budget. Water pricing is an effective policy and management tool. Full cost recovery (FCR) should be a key policy objective whenever water infrastructure investments are made. In most industrial economies water charges, on average, cover the full cost of water, but often part of the water revenue is used to subsidise other sectors. If FCR is not applied in practice, any subsidies should be transparent, whether they come from general public revenue, or indirectly as cross-subsidies from other user categories. Irrigation water tariffs have been generally subsidised, but they are increasingly based on full supply cost or FCR. In developing economies water tariffs are generally below the financial cost of water, and wastewater charges are often not applied. Examples from Kenya and Zanzibar indicate that inappropriate pricing policies and inefficient financial management lead to poor financial performance and deteriorating water services.

Tariff structures have improved in most countries. The tendency is from decreasing-block and flat rate pricing structures to volumetric and increasing-block tariffs. Several innovative social tariff structures have been introduced. In the future, sustainable demand-based strategies should be applied to complement water pricing based on full cost recovery.

Appropriate pricing is necessary, but proper enforcement of tariffs and effective billing and revenue collection are equally important for economic performance. The supply cost of water does not vary significantly in different countries, but tariff structures and policies do. In developing and transition economies water tariffs have often declined in real terms. Tariffs are often set on a political basis, not on an economic one. Water utilities need more autonomy in tariff setting and financial management. Higher water charges in developing countries can improve equity.

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