

# 3

## A Private Connection: The Ultimate Water Supply

In sub-Saharan Africa the rate of household connections is chronically low, between 2 and 7 connections per 100 people.

The primary goal of all water supply utilities is to provide their customers with a 'private' connection to the piped water supply network. For many public officials, policy makers and politicians, a household or yard connection (hereafter referred to as a private connection) is considered the most satisfactory way to meet a number of key objectives, including for instance:

- public health objectives – by ensuring better quality and access;
- commercial objectives – by facilitating cost recovery and revenue generation;
- social objectives – by improving access for the poorest and enhancing security and safety; and
- environmental objectives – by enabling better demand management and water conservation.

Despite the general consensus that the target should be a 'private connection for all', in practice, this goal has eluded many utilities. Among sub-Saharan African capital cities the rate of household connections is chronically low, but varies significantly – from less than 2 connections per 100 people in Bamako, Nouakchott and Port-au-Prince, to over 7 connections per 100 people in Dakar. A comparison of connection rates is provided in Figure iii. In relation to low-income households however this type of estimate does not always provide an accurate picture of service coverage and access, as private connections are often shared by multiple households living in a common compound such as a yard, block of flats or neighborhood. Furthermore, as utility performance declines, households with a private

Household Connection Rates in Urban sub-Saharan Africa

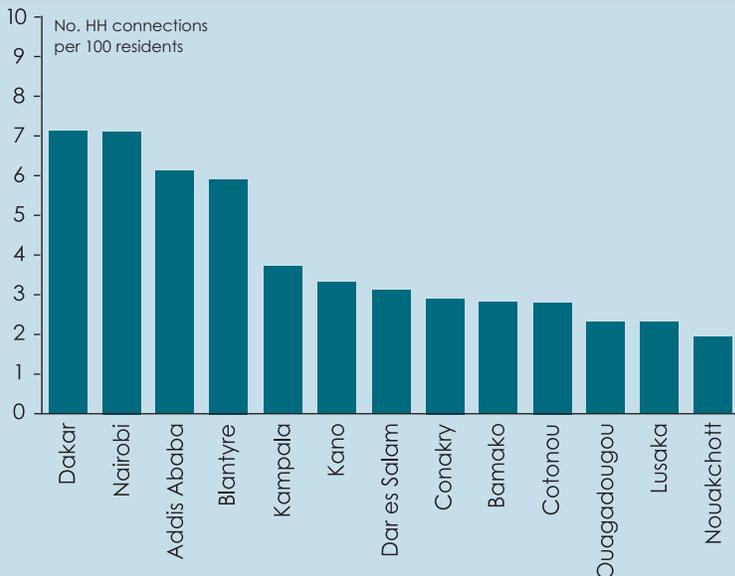


Figure iii

**Note:**

Access to a connection does not guarantee a safe and reliable supply. Intermittent and/or irregular supply are common problems facing many utilities (e.g. some parts of Nairobi receive water only 3 days a week).

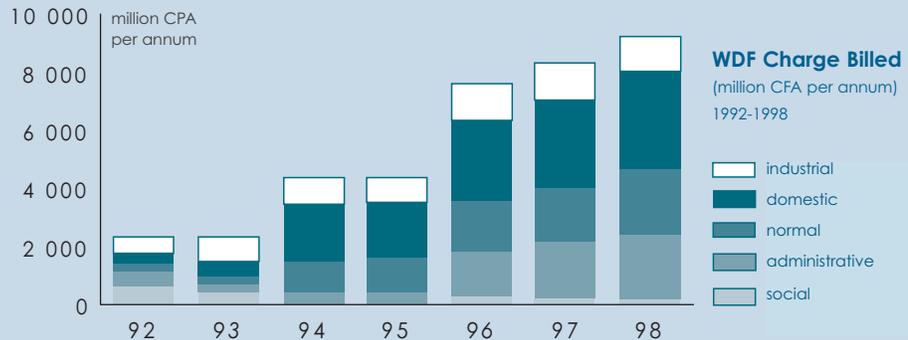
**Source:**

Data drawn from water utilities primary sources, including SODECI, GWSC, EDM, SEEG, SBEE, SDE, DAWASA, NWSC, KNSWB, LWSC, Nairobi Water Board, SONELEC, ONEA, AAWSA (1998 – 1999).

Box 1

**Reaching the Poor through the Water Development Fund in Côte d'Ivoire**

In Côte d'Ivoire, a Water Development Fund (WDF) surtax was first levied in 1987 to provide financing for urban public water supply, and a National Water Fund (NWF) surtax was established to repay loans incurred by the sector. As a result, for the past decade, consumers have financed the primary investments in the sector (subsidies for connection, renewals extensions and new installations) through their contribution to these funds - generated through a charge on the volume of water billed by the utility. Customers from the "normal" and "industrial" bands are the main contributors. Recent tariff revisions have increased the charge some fourfold since the beginning of the 1990s.



Billing band	volume billed %	contribution to WDF %
Social	28	5
Domestic	27	19
Normal	9	22
Industrial	13	36
Administrative*	23	18

**WDF Charge Billed 1992-1998**

\* The recovery rate of billing in the administrative sector is low. These figures indicate what this contribution would be if bills were paid.

The following table indicates the distribution of expenditure (1992-1998). Through connection subsidies and new installations (e.g. vending points), part of this investment has facilitated access for poorer groups .

	CFA	US\$	%
<b>Total collection WDF (million)</b>	<b>37 102</b>	<b>51.5</b>	
Connection subsidy	14 386	20.0	39
Renewals	5 403	7.5	15
Network expansion	10 482	14.6	28
Other (drains, DE, contingency.)	6 830	9.5	18

**WDF Account**

cumulative period 1992-1998

(estimated from the no. of subsidized connections)

**Where the funds go**

About 40% of the WDF charge is utilized for connection subsidies but because the subsidy is accessible to most users, it does not specifically target low-income households. The lack of any disaggregated data makes evaluation of the impacts of the subsidy difficult but households in areas with limited networks, where distances from the mains are significant, do not benefit from the subsidy (the cost of extending a connection beyond 12 meters is paid by the user). The connection subsidy, which represents 90% of the CFA 170,000 (US\$240) cost of a connection of less than 12m therefore fails to provide an acceptable price threshold for poor households.

A further 28% of the WDF is used for network expansion. This amount is currently increasing as new centers are added or network expansion occurs within existing centers. New urban centers, mostly small towns, include many low-income households who benefit significantly. In low-income areas within larger urban centers, closer access to the network enables potential resellers to engage in competition and thus lower connection prices. In Abidjan, a new surtax, that has collected CFA 1 billion (US\$1.43m) to date, was added to the WDF in 1996 for sewerage services. These services do not, however, reach the majority of low-income households.

**Note:**

Exchange Rate  
US\$1 = CFA 700 (2001)

**Source:**

Primary data from SODECI

connection may receive an intermittent or irregular supply. A private connection does not always mean service is adequate at all times.

At the same time, some service providers are experiencing a decline in the level of coverage they are providing through the piped network. They are simply unable to increase the delivery of safe and adequate water supply through private connections. This trend seems to have arisen for a variety of reasons, including the rise in urban poverty and the increasingly informal nature of African cities. Key constraints (discussed in detail below) include affordability, insecure tenure, the unplanned and ad hoc nature of settlements, as well as inflexible technical standards, poor management, inappropriate policy and inadequate legislative frameworks.

As a result of this, there has been growing recognition and acceptance of the need to focus efforts on low-income households – those who constitute the majority without access to a private connection. It is now important to prioritize the actions to be taken and to (systematically) identify and remove those constraints that block the provision of water supply to low-income urban households. In each context, a range of policy and practical changes must be considered – changes that may result in very different solutions. For instance, in the case of Côte d'Ivoire illustrated in Box 1, 'a private connection for all' has become the official policy and strong financial incentives are being developed with private operators to ensure this is achieved. This is also illustrated in the expansion mandate of the private operator in Buenos Aires in Argentina.<sup>1</sup> Alternatively, in the case of Durban, South Africa, illustrated in Box 2, efforts are focused on providing a range of technical options to enable access (to some form of service) to be significantly improved.

The following discussion elaborates on some of the measures that can be considered to increase the access of low-income households to private connections. These include:

- extending the piped water supply networks into informal and unplanned settlements;
- enabling low-income households to afford the upfront costs of a connection;
- removing administrative and legal barriers;
- setting the price of water at a level that is affordable to low-income households;
- developing appropriate mechanisms for managing payment.

**The two primary arguments against network extensions are the illegal status and haphazard layout of many low-income settlements.**

### **3.1 Extend the network into informal and unplanned settlements**

The majority of households without access to a household connection are those living in informal settlements – and the majority of these are low-income. In Dar es Salaam, Lusaka and Blantyre, an estimated 70% of the city is informal and in Nairobi it is estimated that 55% of the population reside in informal settlements that lack adequate network infrastructure. In order to access the services they need, many of the non-poor have taken their own initiative, extending pipework for several kilometers to a single dwelling, or combining efforts for mutual benefit. However for the poorest households, the problem is more difficult to solve. It is unlikely that they

<sup>1</sup> In both cases, difficulties in targeting services to poor households have been experienced

## Box 2



Outside view of ground tank



Internal view of new facilities

### Low-pressure Water Tank Systems in Durban, South Africa

Durban is South Africa's second-largest industrial hub and one of the country's fastest-growing urban centers. Much of the city's population of three million lives in areas that were previously black townships with separate administrative bodies under the old apartheid system. These areas have poor infrastructure and many have traditionally had inadequate water supply and sanitation service provision. They have now been incorporated into the city jurisdiction, alongside urban areas with full conventional reticulated water supply and sewerage systems. However, addressing the resulting imbalances in the provision of water and sanitation services and quickly reaching the large number of unserved, poor households are major challenges for the city.

#### Extending water supply services to the poor

Durban Metro Water Services (DMWS), the department of Durban Metro which deals with water supply, sanitation and solid waste, has developed 360,000 metered water connections. However, it is estimated that 155,000 households (500,000 people) in the city lack household connections. They rely on standposts, many of which were inherited by DMWS from the previous provincial administration, or are not served by piped water at all, and use surface water such as streams. There are also an estimated 10,000 to 20,000 illegal connections to the piped system.

In order to reach its low income customers, Durban Metro Water has expanded the range of service options to include: conventional full-pressure system, semi-pressure system with ground tanks, semi-pressure roof tank system, and standposts. Two interesting innovations are the low-pressure systems (roof tanks and ground tanks) which can be installed at a lower installation cost than conventional systems, use small diameter, low pressure pipes, inexpensive valves and fittings, and manual labor.

#### Semi-pressure system with ground tanks

Water is reticulated using small diameter (less than 50mm) plastic piping (polypropylene, HDPE or high impact uPVC), which is laid at shallow depths along the roads or tracks in the area to be served, 'snaking' where necessary to avoid obstructions. At suitable intervals a metered manifold box is installed, from which 20 households can be connected. The household itself pays for a feeder pipe, usually 12mm, from the manifold to a 200 liter tank, and digs the trench from the manifold to the dwelling. The pipe work is supplied, laid and connected by DMWS. The tanks are either installed on the ground on plinths made of concrete-filled used car tyres, or on metal stands, and can be installed either inside or outside the home, according to the householder's preference.

Many householders plumb the tank to supply water to fixtures within the house. Originally, a water bailiff, a local resident employed by Durban Metro Water, turned on supply to the tanks for a short period of time each day, just long enough to allow them to fill, but now this is done electronically. Each tank is provided with a float valve to stop it from overflowing when it is being filled, and an outlet valve to prevent it from being emptied while it is being filled. Each household is thus provided with 200 liters per day, in line with current South African water policy, which dictates that every household must be provided with 6m<sup>3</sup> of water every month. Durban Metro Water has made the decision not to bill households for this level of supply, so the 6m<sup>3</sup> monthly consumption is free of charge.

Source:

Brocklehurst, 2001

can afford the options currently open to them and it is likely that a number of other constraints will stand in their way.

The first step in a strategy to improve access to private connections should be to facilitate the extension of network infrastructure into those informal or unplanned areas

that are currently without network services. The two primary arguments against network extensions are the illegal status and haphazard layout of many low-income settlements that have evolved without formal planning. These are discussed in turn below.

### The Role of Tenure in Improving Access to Water Supply: a Comparison of Ethiopia and Kenya

Box 3

Secure tenure plays an important role in determining whether poor households have access to water supply and sanitation. In countries such as Ethiopia where most households have secure tenure, the **utility is not restricted** in its provision of services. The utility has managed to extend services to an estimated 90% of the population through a combination of service options including standpipes, yard and house connections – they are not restricted by building codes or unachievable standards. It is interesting to note that many of the mud and wattle structures occupied by poor households are owned by the Ethiopian Government and as a result poor households are tenants of the government and eligible for a service.

By comparison, in Kenya where a majority of low-income households live in informal settlements and households lack formal tenure, the utility has often restricted its supply of water to the boundaries of the area to be served, leaving it up to **private entrepreneurs** to establish water kiosks at their own cost (and risk) by drawing long pipelines into the settlement. In Kibera, a settlement in Nairobi of up to 500,000 people, more than 1,000 private connections have been installed. These pipelines stretch up to 1 kilometer from the nearest utility main. Increasing security of tenure is a key step that governments can take to avoid inefficiencies and improve access to water supply to poor households.

**Source:**

Simie, 2000

### Extending networks to informal settlements

Many service providers, both private and public, justify the lack of service delivery in informal areas because settlement took place illegally or in a haphazard manner and may not then have been recognized. They argue that the lack of secure tenure or lack of compliance with building codes and standards makes any intervention in these areas problematic and risky. Unclear legal status increases the possibility of eviction or demolition of the settlement (including the infrastructure).

Yet, in many of these cities, electricity or telephone services are being provided in informal settlements where water connections are said to be illegal and impossible. This may be justified from a practical point of view: electricity and telephone networks are installed overhead, thereby limiting physical works and the facilities and infrastructure can be moved or removed quite easily if necessary. More critical however is the concern amongst authorities that if pipes are installed in areas without legal status, their permanence may be seen as providing a stamp of approval or some degree of legitimacy to the residents.

Evidence also suggests that, in practice, the main barrier to the extension of public services in informal settlements is not the irregularity, but the lack of political will. In many cases, the failure to extend services is a result of rigid or outdated policy and legislation, as well as a lack of official recognition of the magnitude and scale of the problem. In some countries such as Ethiopia, Tanzania and Nigeria, security of tenure is not a major constraint, and there are limited administrative or legal restrictions that prevent the utility from extending the network to most communities. In other situations, such as in Kenya and Côte d'Ivoire, the lack of secure tenure is a significant

blockage, one of many administrative and legal barriers constraining improvements in the access of low-income households (see Box 3).

Authorities should make efforts to address security of tenure constraints by direct and indirect action. This may include:

- Facilitating some form of immediate tenure that may stop short of full land title. (A full form of title may be laborious to arrange and a less contentious form may still give residents and utilities the comfort that occupation is guaranteed for a fixed period of time (e.g. the right to occupy the land for 10 years).

Box 4

#### Low-cost Standards for the Urban Poor in Manila: Water for the Community

Responding to the need for alternatives for reaching the poor, one of the Manila concessionaires has developed a system for water delivery in densely-populated, hard-to-reach slum areas. In Bayan Tubig ("Water for the Community") systems, an underground water line carries water to the perimeter of a slum neighborhood, and is then extended above ground – partially covered, attached to a wall, or lying on the surface. The line connects to a **battery of meters** from which each homeowner makes their own plastic connection using small diameter pipes running from the main to households on the surface or along walls. Maintenance responsibility for the plastic pipes lies with the customers. Community-based organizations and NGOs play a role in intermediation and mapping of the network.

Estimates suggest that the Bayan-Tubig connections have **reduced water costs** for poor families by up to 25%; a figure that explains the popularity of the scheme despite what are, for poor families, relatively high costs up to PHP4,850 (US\$97). To make the scheme more affordable, the concessionaire has introduced an interest free repayment scheme over a period of 6 to 24 months. The program had provided water connections to 19,000 poor households by the end of the year in which it was initiated (1999) and to the end of 2001 had served more than 50,000 households.

One of the reasons that the private operator uses such lower cost service solutions is that the concession contracts do not contain restrictive standards for what constitutes a connection, do not disallow third party provision, and allow the concessionaires to add households served through such initiatives as Bayan Tubig to the "covered" population for the calculation of compliance with **coverage targets**. The Bayan Tubig project illustrates that in an enabling contracting environment the private sector operators will seek innovative solutions to make water supply more accessible and more affordable for the poor.

**Note:**

Exchange Rate  
US\$1 = PHP 50.00 (2002)

**Source:**

Extract from Rosenthal, 2002

- Agreeing in principle that all consumers should be provided with access to water supply regardless of their location and that the service provider be given the mandate to work with any community to design and deliver an appropriate service.
- Allowing the service provider to modify their traditional approaches and procedures to make service provision feasible in the short and medium term (e.g. by permitting pipes to be laid for an agreed period, laying pipes above ground (as illustrated in the case of Manila in Box 4), or laying pipes on private land (as illustrated in the condominium systems of El Alto described in Box 5).

### Extending networks in unplanned settlements

Laying piped water supply networks also requires a certain amount of planning (or order) in the layout of the settlement. While this ensures that construction and operation is feasible and efficient, the absence of a planned layout should not pass

as an argument against network extension – just as the lack of land tenure should not constrain provision in informal settlements. It is of course inevitable that underground piped systems are more difficult to install where the layout is somewhat haphazard and it is therefore necessary to consider alternative options that suit the local conditions. Some of these will be similar to those solutions proposed to overcome the constraints of informality, such as laying pipes above ground and/or through private land. Municipalities have attempted to address the unplanned nature of low-income settlements in a range of ways. In conjunction with residents and resident's associations, some municipalities have established intermediate planning measures as part of an overall urban development project. These measures have enabled municipalities (e.g. Man, a town in Côte d'Ivoire) to agree the layout for water supply lines, drainage and other urban infrastructure and to set aside uninterrupted public space for this purpose (as in a service corridor).

### Laying Lines in Private Space: the El Alto Condominium System in Bolivia

Box 5

In a conventional network system, every household acts as an individual user and is provided with a connection to the main pipework located in every street. In the condominium system introduced in Bolivia, one network runs through the whole block with **a communal connection to the main network**. These systems reduce the cost of in-house water and sewerage connections by using smaller pipe diameters, fewer pipes and burying them in shallower trenches that run under plots, rather than on main streets where they would be damaged by heavy vehicles.

While the utility is responsible for the mains network in El Alto, it was envisaged that the **maintenance** of pipes running through private property would be the responsibility of individual households in the community. Evidence from a recent study commissioned by WSP indicates that savings of up to 40% were achieved by involving the community in construction of both the water and sewerage systems.

**Community participation** and social intermediation may have contributed to an increase in the rate of connections by creating a higher level of acceptance among households than in other areas where no community participation was involved. Twice as many households receiving hygiene education were likely to install a bathroom than those who did not.

Source:

Extract from Foster, 2001

**Some municipalities have established intermediate planning measures, others have agreed on temporary facilities.**

Other municipalities have formed agreements with the main service provider that will allow independent and intermediate providers to establish temporary facilities – either through a temporary permit/license or moratorium. These options are discussed further in Chapter 5. In the context of Manila, the Philippines, illustrated in Box 4 above, the contract does not specify the particular methods to be used by the operators and has enabled significant improvements to be achieved through a concentration of meters installed at the periphery and plastic pipes laid above ground within the settlement. In Port-au-Prince, Haiti, the installation of piped water supplies in shantytowns was permitted as part of a network connected to temporary fiberglass overhead tanks. In Ouagadougou, Burkina Faso, 25 stand-alone water points (pumping stations with boreholes supplying a tank and standpipe) were designed so that they could be moved when demand changed<sup>2</sup> and in Durban, it has been agreed that services will be provided in temporary settlements and moved if and when it becomes necessary.

### Financing network extension to low-income settlements

Obtaining the agreement necessary to extend networks into informal settlements is

<sup>2</sup>Some were, in fact, repositioned after a few years. See for example the case study on Port-au-Prince, Haiti, prepared by Cisse as an input to the 10 country study on SSIPs, WSP, 1998

an important first step, but it does not, in itself, remove the bottlenecks associated with improving access for poor households. Network extensions require significant investment and financing may need to be identified for laying or upgrading primary, secondary and tertiary systems as well as improving production and storage facilities.

Apart from the general lack of resources and poor financial management, financing may be constrained by a number of other factors. In most cases, informal settlements do not contribute to the tax base (as property taxes and levies cannot be collected) and these areas may not then be considered when decisions are made about the allocation of resources. Financing of extensions may be limited by the utility's own revenue generation potential. Formal investment is often targeted at planned areas where legal status is clear and investment risks are low. While risk is normally linked to the informal nature of settlements, it may also be linked to a perception that poor households will not pay for services and the utility will therefore not recover its costs. In cities such as Kano, Nigeria and Addis Ababa, Ethiopia where land tenure and legal constraints do not create blockages, the utilities have financed 100% of the costs of network expansion and standpipe installation in informal settlements.

In several cases (Côte d'Ivoire, Burkina Faso and Senegal), utility revenue is enhanced through a specialized sector fund. The Water Development Funds (WDF) developed in Côte d'Ivoire and Senegal, for instance, are based on a water consumption tax levied on consumers in the higher tariff blocks. In Abidjan, the main service provider, SODECI, has utilized the fund to implement a connection program that has benefited households in all areas including low-income settlements.

Apart from the utility's own revenue stream, important sources of financing in the countries investigated often comes from donors and NGOs and specialized sector funds. Some utilities enter into cost-sharing arrangements with households applying for network connections to facilitate the extension of services into low-income settlements. In Ghana, the utilities share costs with residents' organizations, providing up to 50% of the capital cost (see Box 6). Other utilities such as Lusaka and Blantyre do not finance extensions in informal settlements directly but they often depend on the municipality, residents, donors and/or NGOs to finance community projects in these areas.<sup>3</sup>

### **Developing appropriate standards and flexible delivery mechanisms**

In most countries, a key constraint to network extension is the inflexible nature of the technical standards established by the government and/or the main service provider. Although these standards are intended to improve the quality of construction (materials and workmanship), high technical specifications are often unattainable in informal settlements due to the cost, the haphazard layout and/or difficult geo-physical characteristics.

Most operators also have a set menu of service options and classify their customers into a narrow range of categories: domestic, commercial, industrial, governmental institutions. The majority of utilities consider domestic customers as a homogeneous group – as though they are all alike. Many restrict households in unplanned areas from obtaining household connections and provide standpipes or kiosks instead. Furthermore, they apply a standard set of rules and procedures regarding applications, connection payments, deposits, etc (derived from western standards) to all types of customers that are eligible for the service, regardless of settlement patterns and incomes. As the standard package is tailored for medium and high-

**The water development funds are based on a water consumption tax for consumers in the higher tariff blocks.**

<sup>3</sup> Funding from donors are typically grants for predefined projects in specific communities. They may be channeled through governments or NGOs. (Kariuki, 2000)

### Cost Sharing Arrangements between Users and the Utility in Accra, Ghana

Box 6

Accra, like all other large African cities, is experiencing rapid growth. Its population increased from 1.2 million to 2.2 million between 1984 and 1999 (an average growth of 3.2% a year, well over the national rate of growth of 2.6%). In Accra, it is estimated that the urban poor number around 800,000. While 80% of "well-off" neighborhoods have connections to the public supply, this figure falls to 16% in low-income neighborhoods. As the public water supply does not reach all areas, a large part of the city is supplied by water tankers.

Price of water according to supplier	(\$/m <sup>3</sup> )
Social tariff GWCL (0-45m <sup>3</sup> /month)	0.39
Normal tariff GWCL (46-70m <sup>3</sup> /month)	0.78
Tanker trucks	1.6 - 2.1
Sale price of resellers	3.2 - 4.4

#### Communities split network extension costs with utility

Water supply in the city is currently the responsibility of the Ghana Water Company Limited (GWCL), a financially independent company owned by the State. In 1998, GWCL supplied 123,000 customers in Accra and surroundings, of which 111,820 were domestic customers. This amounts to about 5 connections for each 100 residents.

Due to its limited financial resources, GWCL introduced a cost-sharing arrangement which allows communities to obtain a network extension faster than they would otherwise have done had they waited for the utility to include this in a network expansion program. Communities currently share capital costs (around 50%) with the utility or other customers. Funds are collected up front by community organizations (often established for the specific purpose of improving water supply). Some community groups now have the legal status and registration which enables them to enter into contracts with the utility.

#### An example: a local Resident Association negotiates its service

One example of this arrangement occurs in an area known as Christian Village, an unplanned area with 5,000 inhabitants. In 1990, a group of residents established a local Residents Association. The association took the initiative to meet with GWCL and a nearby brewery to negotiate an agreement to increase the size of a new main line being laid so that a branch line could be extended into the community. Despite the fact that a meter was installed, the community is charged a flat rate for water consumed. New members must pay the cost of their connection and monthly fees are paid to the association. The association now has 92 members connected to the community network. Each paid an average of ₵136,000 (US\$40) per connection toward the capital cost and contribute and contribute on a monthly basis to water and maintenance costs.

#### Approach spreading to over 20 communities

This cost-sharing arrangement makes network extension easier for GWCL. The approach has been extended to over 20 communities in the Accra area – although arrangements differ from one community to another. It also enables the community to subsidize costs for low-income households within the area. The arrangement has helped to improve relations between existing residents. In some communities new customers are expected to contribute to the initial cost of the extension, by repaying a joining fee that offsets the capital cost incurred by the initial members. In practice, this repayment is difficult to obtain as the member share is often informal (according to the cross-subsidy applied).

As a part of this process there has been some discussion between community associations and GWCL to clarify responsibilities and ownership. Some associations demand full management control over new extensions and would like to refund GWCL the full cost of the extension, install a bulk meter, resell water to their residents, and maintain the pipes and connections. Several would like GWCL to charge a preferential rate or at most the social tariff without any volume limitation. Such systems seem to be workable, as GWCL already has such an arrangement with tankers' associations, to which it sells bulk water at ₵1,500 (US\$0.44) per m<sup>3</sup>. Even though this is slightly more expensive than the social rate of ₵1,320 (US\$0.39) per m<sup>3</sup>, it would be more advantageous than the sliding scale. GWCL has already informally accepted such an arrangement for extensions in some unplanned areas.

#### Note:

Exchange Rate

US\$1 = ₵ 3,400 (1999)

Ongoing urban water supply reforms are expected to lead to a public-private partnership for the delivery of water supply services to Ghana's urban centers in the future.

#### Source:

TREND, undated

income customers living in formal/planned areas, it is often inappropriate or out of reach of those residents who live in informal settlements, especially those who fall below the poverty line and/or share a water meter or water point with several other households.

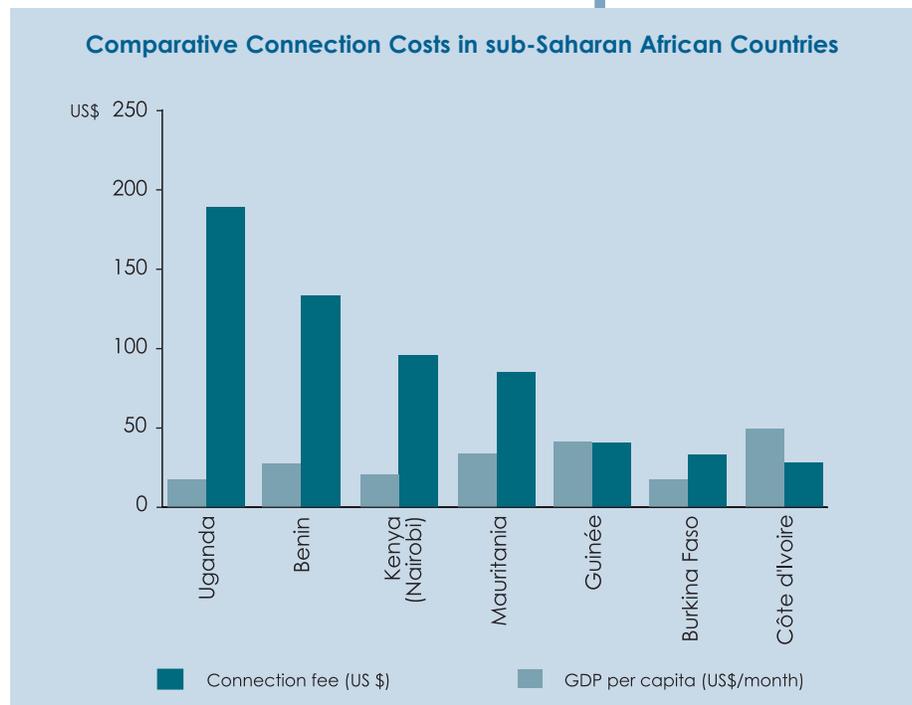
Standards should be flexible and adapted to local circumstances in order to provide a basic level of service that responds to the needs of the target population and addresses local constraints. In Ouagadougou, Burkina Faso the main service provider, ONEA, has introduced an intermediate standard for peri-urban areas. This comprises medium-sized pipes connected to standpipes that can then operate at full-pressure. Although this intermediate standard does not initially include private connections, it is intended that the network be upgraded gradually to respond to demand. The case of Manila in the Philippines, discussed in Box 4 is again a useful reference. As the private operator's contract allows for innovative solutions to be used, the proposal adopted includes above ground pipes in informal settlements where other alternatives are not feasible. This option has enabled the operator to provide a temporary service that is easy to install, affordable and creates an improved level of service for the consumer.

**Standards should be flexible and adapted to local circumstances.**

### 3.2 Lower the price of a private connection

The price of a new connection also constitutes a significant barrier for low-income households. This initial payment to connect to the network, which includes the standing charges and deposit, may well be equivalent to several months income for low-income households whose first priority is to satisfy daily needs. As a large number of low-income households earn income on a daily or weekly basis, most are unable to save sufficient funds to cover the substantial up-front connection costs charged by the utility.

Figure iv



Source:

Primary data collected from water utilities.

GDP per capita data from World Bank, 1997

**Lowering the price threshold for a connection should be at the heart of any strategy to increase network coverage.**

**Making subsidies work – making sure they reach those who need them most – is an ongoing challenge.**

<sup>4</sup> The main constraint is insecurity of tenure and haphazard layout as discussed earlier.

The high relative cost of connections can be illustrated by comparing GDP per capita and connection costs in a range of sub-Saharan countries (see Figure iv). For instance, in Benin, the cost of a connection is five months GDP and is four months GDP in Kenya. However by definition, the low-income have incomes that are lower, sometimes significantly lower, than the average GDP and this comparison does not fully reflect the vast disparity between costs and incomes. Connection costs vary from US\$200 in Kampala, Uganda to US\$50 in Ouagadougou. When compared to the cost of a connection in Buenos Aires in Argentina in the mid-nineties (US\$1000) these appear low. However for the majority of the urban poor who live below the US\$1 per day poverty line, the costs of connecting to the network push this option outside their reach.

Lowering the price threshold at which the poor can access a connection should be at the heart of any strategy to increase network coverage. This is particularly important in those contexts where a significant proportion of households already have a private connection. For example, in Abidjan, 70% of households have a private network connection and extension is therefore a viable option but for the remaining 30% of households, many of whom reside in unplanned areas where subsidized rates do not apply, the high cost of the connection constrains access.<sup>4</sup> Where coverage rates are low however, the first priority may be to develop a network of standpipes or water kiosks as an intermediate strategy and shift towards private connections over time.

### Subsidizing the cost of a private connection

In 2002, the base cost for a private connection was between US\$150 and US\$200 but the actual cost of a connection depends on the metering (whether a water meter is supplied or not) and the distance between the mains and the house (or yard). In many informal settlements, where access is limited, the distance from the network distribution lines is a major problem. In some cases distances are over a kilometer and the cost of additional materials and labor is being passed on to the customer.

The most common means of lowering the 'access threshold' to a connection is to subsidize the cost. It is clear however that making subsidies work – making sure they reach those who need them most – is an ongoing challenge to the authorities and utilities responsible. A strategy for subsidies will address:

- the level of the subsidy to be provided to the household;
- the criteria for targeting the subsidy at particular areas/households;
- the mode of financing the subsidy; and
- the number of households that qualify for the subsidy.

**Connection Costs in Côte d'Ivoire**

	Normal (US\$)	Subsidized (US\$)
Cost of connection up to 12 m	+/- 227	0
Advance on consumption	23	23
Standing charges	4	4
Meter fitting	13	0
<b>Total</b>	<b>267</b>	<b>27</b>
Reconnection cost	48	48

Figure v

**Note:**  
Exchange Rate  
US\$1 = CFA 700 (2001)

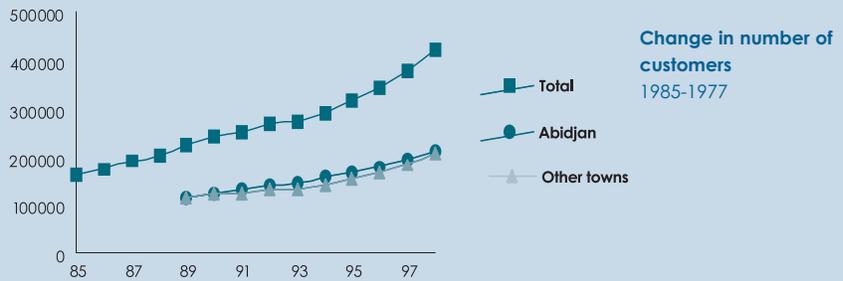
**Source:**  
Primary data collected from SODECI, 1998

Box 7

**Subsidizing Low-income Consumers through Tariff Reform in Côte d'Ivoire**

In Côte d'Ivoire an approach to cross-subsidies was introduced with the aim of maintaining the financial equilibrium of the water sector and simultaneously promoting access to the utility water supply. The subsidy was firstly applied across all towns – thus enabling consumers in all locations to obtain water supply at the same tariff. Secondly, a subsidy was introduced between different categories of consumers through a progressive (sliding scale) tariff. This scale means that large consumers pay part of the cost of delivering water supply to small consumers, and contribute to the basic capital investments of the sector.

Out of the 544 urban centers in which SODECI works, only 7 realize a profit. Abidjan – which enjoys favorable hydro-geological conditions (groundwater source) and whose population size and density create economies of scale in water distribution and customer management – is the most profitable. Other centers are less well endowed and have production costs double those in Abidjan: in 1996, Abidjan represented 52% of SODECI's customers, 66% of volumes billed, 50% of all income and 60% of all water produced.



The sliding tariff (see below) is designed to enable the creation of a Water Development Fund (WDF) to finance connections for low-income households and other priority investments. The tariff includes a basic charge, a surtax that contributes to the WDF and a surtax that contributes to the National Water Fund (NWF). The subsidy provided by this tariff scale makes it possible to provide a large subsidy for the first 6m<sup>3</sup> consumed per month thus making a basic service (about 30 liters per day per person for a family of 6 persons) accessible to those households connected to the network.

Band (m <sup>3</sup> /month)	SODECI tariff	Charge WDF	Surtax NWF	Total	<b>Water Tariff</b> (from May 1996) CFA/m <sup>3</sup>
Social (0-6)	160	10	14	<b>184</b>	
Domestic (7-30)	220	54	12	<b>286</b>	
Normal (31-100)	220	197,5	46,5	<b>464</b>	
Industrial (>101)	220	228	85	<b>532</b>	
Administrative	220	57	119	<b>390</b>	
Public standpipes	175,5	45,5	95	<b>311</b>	

However some households do not reach the minimum volume for billing (3m<sup>3</sup>/month) and others (large households and those buying from water resellers) do not benefit as their consumption rate falls in the higher band of tariff

**Note:**  
Exchange Rate  
US\$1 = CFA 700 (2001)

**Source:**  
Primary data collected  
from SODECI

**Subsidy level and amount** • The level of subsidy and other charges should be affordable and should be set at an amount that is sufficient to ensure that the applicant will then be able to pay his bills – and it should be higher than the cost of reconnection. In Côte d'Ivoire, for instance, an applicant pays an advance on consumption and a standing charge (resulting in a connection cost of only US\$27 – 10% of the unsubsidized cost of US\$270). A large subsidy or exemption from all payment can have adverse effects and often leads to high rates of disconnection. In the case of Côte d'Ivoire, illustrated further in Figure v below, rather than pay for reconnection (at a cost of US\$48), some consumers that are disconnected apply for a new 'subsidized' connection (using a different household member's name) instead of paying the reconnection fee.

**Criteria for targeting the subsidy** • While it is generally accepted that subsidies should be targeted to the poorest households, in some countries, there are no criteria relating to the applicants' income level and funding is often 'captured' by the non-poor. This is the case in Benin where 'social connections' are awarded on a first come, first served basis. It is also the case when fees do not reflect the real costs of the connection, as in Burkina Faso or Guinea, and the connection cost is therefore subsidized by other consumers or through losses incurred by the utility. In other countries, the criteria developed for targeting the subsidy have been inadequately framed and allow most consumers to benefit. In Côte d'Ivoire, over 90% of the 290,000 connections installed between 1986 and 1998 were subsidized. As a result in 1999, in an attempt to reach those most in need, the subsidy was redefined to focus on consumers requiring only 4 taps. This step also made it clearcut that the property developers were not eligible for the subsidy.

Although some utilities prefer to use income levels as a basis for subsidy targeting, these are difficult to set, seldom reliable and cumbersome to administer. This is particularly the case in those African cities where the majority of households are not able to gain access to a private connection due to legal or physical limitations and a large number of households are considered poor. One alternative is to target clearly defined areas within a city where poorer households live, as is the case in Senegal.

**The mode of financing the subsidy** • The source of funding is a crucial factor determining the efficacy and sustainability of the subsidy arrangement. While the cost of a connection may be financed as part of a donor-funded project, as in Senegal and Benin, this approach is unsustainable as financing is discontinued after the project ends. A more sustainable arrangement is established if subsidy financing is built into the tariff as a tax levied on households connected to the water supply. In this form the subsidy may be considered a credit facility, as the beneficiary will contribute to the fund once they start paying their water bill, thereby facilitating the connection of new subscribers. It is also possible to strengthen the 'social' dimension of subsidies by charging large-scale (domestic, commercial and industrial) consumers more for services. This is the case in Côte d'Ivoire where the subsidy is funded by a tax levied on consumers billed in the higher blocks in the tariff (see Box 7). Large consumers therefore finance the bulk of the subsidy when connection charges are below real costs.

At the other extreme, some arrangements require all consumers to contribute to connection subsidies, often achieved by periodically invoicing a fixed fee. This type of subsidy arrangement is less favorable to poorer households as they end-up contributing to the subsidy at the same rate as high-income households. In 1999, in Buenos Aires, for example, all new connections are subsidized by charging all customers a quarterly



universal service and environmental fee (SUMA) of US\$3 to fund network expansion. This approach resulted in a one-off connection cost of US\$120 to new users.

**The number of households that qualify for the subsidy** • A policy is only relevant and effective in meeting social objectives if the number of connections being subsidized is proportional to the customer base. In the case of Abidjan, Côte d'Ivoire, illustrated in Box 7, approximately 10,000 connections were made annually over a period of 15 years (increasing the connection rate from 5 to 8 connections per 100 residents). Because the criteria used by the utility to select recipients were quite broad, in practice the subsidy can assist all (low, middle and high-income) households, but in practice as it is only applicable in planned areas, many low-income households are not eligible and do not benefit from the substantial funding support available.

### Establishing credit facilities to cover connection costs

Irrespective of subsidy arrangements, credit facilities can be an important way to provide additional support for low-income households wishing to pay connection

Box 8

#### Improving Access to Savings and Credit for the Urban Poor in Mumbai, India

An estimated 65% of Mumbai is covered with slums, accommodating 62% of the population. However slum dwellers use only 18% of the water supplied by the city and pay Rs.5 (US\$0.10) on average for a bucket of water, which they buy from private water vendors. At the same time, 95% of them use public toilets for which they pay Rs.1 (US\$0.02) per use, thus spending Rs.200-250 (US\$4.30-5.30) per month on sanitation and about Rs.15-25 (US\$0.30-0.50) per day on water.

#### Enabling the poor to save

Mahila Milan, a microfinance institution has partnered with organizations working with communities in Mumbai's low-income areas. Mahila Milan is a federation of women's collectives in Mumbai and 23 other cities of India, working under the umbrella of the National Slum Dwellers Federation. Mahila Milan's activities include supporting the needs of its members for both savings and credit and for accessing better housing and infrastructure.

The savings and credit activity was first initiated in order to create a crisis fund and promote regular savings by the women. However, over time, the women argued that even if they were successful in lobbying the government, and as a result were provided with land for their eventual relocation, they did not have the means to finance the cost of building adequate shelters and related infrastructure. Thus, the savings and credit program was further developed.

#### Financing neighborhood services

Fed up of waiting for an institutional source of credit for 'bridge funds' to finance more time consuming and complex infrastructure projects, the Society set up an internal fund for its members. Made up of donor grant funds and an interest component from Mahila Milan's savings, this centralized fund, called the Infrastructure Bridge Fund, is used to make lump-sum payments to authorities for infrastructure services such as water and electricity connections. Over time, the up front payment is repaid by community members that have benefited and returned to the Fund. Without access to such (relatively) large-scale 'bridge loans' it would take much longer for communities to pay for and access services such as housing, electricity and water which required sizeable front investments.

In addition to constructing 120 houses, one Mahila Milan society - the Jankalyan Cooperative Housing Society was able to improve access to water supply using financing support from the bridge fund. With Rs13,000 (US\$277) from the bridge fund, the Society requested the municipality to provide common water stand-points supplying water for 22 hours a day. The total cost of connections was financed from the bridge fund and the individual contribution from each household of Rs.110 (US\$2.34) collected by the Mahila Milan and repaid into the Society's bridge fund.

**Note:**

Exchange Rate  
US\$1 = Rs. 47 (2001)

**Source:**

Water Supply and Sanitation  
Program - South Asia, 2001

## Credit facilities are an important means of paying connection costs.

costs. A credit facility may be extended to households by the utility or by another financing agency. This may take one of the forms outlined below.

- **Credit granted by the utility** The utility may provide credit in the form of a 'tax' on the price of each cubic meter consumed, to be repaid by the consumer in proportion to their consumption. This levy is paid for an agreed period (for example 24 or 36 months) or until the agreed connection costs are repaid. Alternatively, credit extended by the utility may be repaid monthly (bimonthly or quarterly) through standing charges that allow households to repay the connection costs in addition to the regular bill.
- **Micro-credit institutions, commercial/community savings and loans systems** Micro-credit mechanisms exist in most African cities, although they are not commonly used for household water supply. The activities of the Mahila Milan in India (illustrated in Box 8) have been successful in providing households with credit facilities for household connections.
- **Project-based savings/loan systems for household connections** Some urban development projects set up specific opportunities for savings and loans (e.g. water supply connections). However, this type of structure is generally site specific and may not be sustained after the project is completed.
- **Advance payment arrangements** Some operators, such as the regional branches of SODECI in Côte d'Ivoire, allow applicants to spread the payment of connection costs over several months. The connection is then carried out when the total sum is paid. This arrangement is informal.
- **Payment in kind** A utility may also agree to accept part of the connection payment 'in kind'. In El Alto, Bolivia, illustrated in Box 5, consumers can pay in kind by contributing their own labor to undertake a specified quantity of work for the utility (e.g. digging trenches for secondary pipework not directly linked to their own connection in exchange for a free connection).

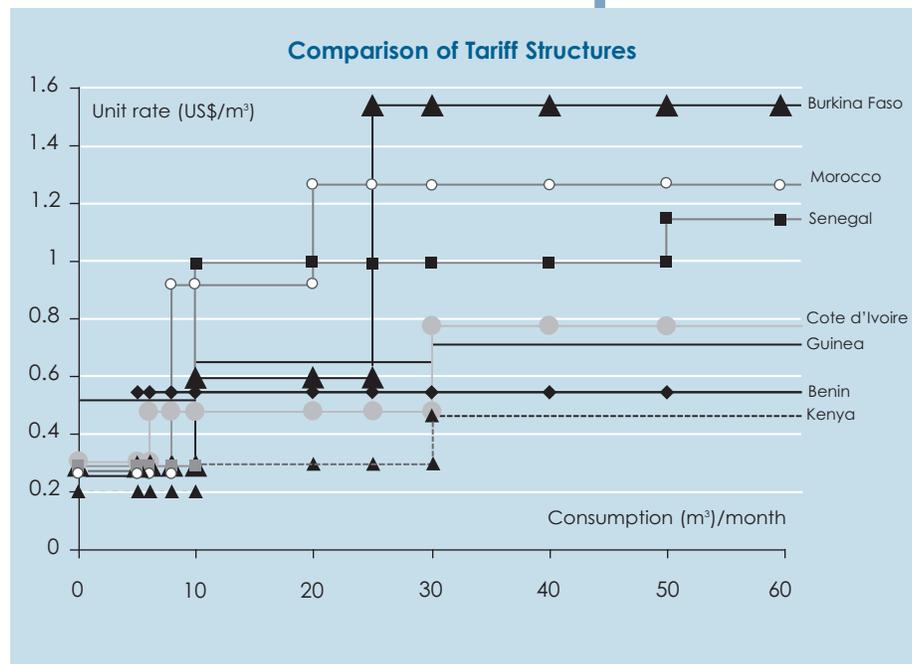
### 3.3 Remove administrative and legal barriers to a connection

Section 3.1 highlighted the particular access problems faced by residents of informal and unplanned settlements due to poor physical layout or lack of physical planning. Utilities often require that those households wishing to obtain a connection provide formal proof of ownership or occupation (a title deed or rental agreement). The lack of access to formal documents is often a constraint affecting the capacity of households to obtain household connections. Although these measures are intended to protect the utility from litigation and non-payment, they often constitute additional obstacles. In countries such as Tanzania, Ethiopia and Ghana where security of tenure is not equated with a title deed, and utilities have moved forward without the paperwork, additional problems have not generally arisen. Traditional tenure may in fact be a more secure form of tenure, and may also mean that a greater number of low-income households have legal standing. As discussed above, efforts to increase access to connections should focus on removing requirements for proof of ownership and occupancy, and minimize administrative procedures to obtain the paperwork (e.g. title deeds) are minimized.

In other cases, regulations are not tailored to suit the way low-income households live. One example of this arises when many low-income households share the same building or compound. Utilities may prefer each household in a shared building or compound to obtain a separate meter in order to avoid complicated technical arrangements and mixed responsibility for payment of monthly bills. Yet in the context of low levels of service coverage, shared connections enable many poor households to access a service and it is necessary for utilities to see the benefit in permitting (and catering for) them. In Nigeria and Ghana, shared connections are accepted practice and an effective delivery mechanism for low-income households. Where it is more common for communities to contribute towards the cost of distribution pipework, shared connections and meters are becoming an important means of improving access. Administrative procedures must recognize and not constrain this option.

**Administrative procedures must recognize and not constrain the sharing of connections.**

Figure vi



### 3.4 Reduce the cost of water supply to poor households

Once connected, it is essential to ensure that low-income consumers are able to afford an adequate supply of water for their household needs. While ensuring that cost recovery targets are met, utilities should identify means by which low-income households should have access to a 'lifeline' supply at an affordable rate.

#### Structuring tariffs to target low-income households

Consumption per connection does not equal consumption per capita. Progressive tariffs are commonly used in African countries, although the structure of the tariff varies significantly from country to country. In Burkina Faso, Senegal and Mauritania for instance, progressive tariffs are steep, penalizing high consumption users, while in others such as in Kenya, particularly in Nairobi, the gradient is less marked but the tariff includes numerous small blocks/steps making it difficult for a consumer to understand the basis upon which they are billed (see Figure vi).

**Households should have access to a 'lifeline' supply at an affordable rate.**

In order to establish effective pricing policies it is necessary to consider the way the water is consumed in any given context.

Designing an effective tariff structure is an important means of improving access to water supply for low-income households. However, in order to do so, it is necessary to consider the way water is consumed in any given context. This might include consideration of the following factors.

- The proportion of low-income households that have access to a private connection** If less than 40% of households in a service area have access to a private connection, the social block in a tariff is unlikely to have a significant impact on the target population. Low-income households that are not connected cannot enjoy the subsidy. Instead, as is the case in Mali, the benefits of such a policy are enjoyed by 'connected' households – all from higher income groups.

Contributions of Consumers to the Water Development Fund in Côte d'Ivoire (1992-1998)

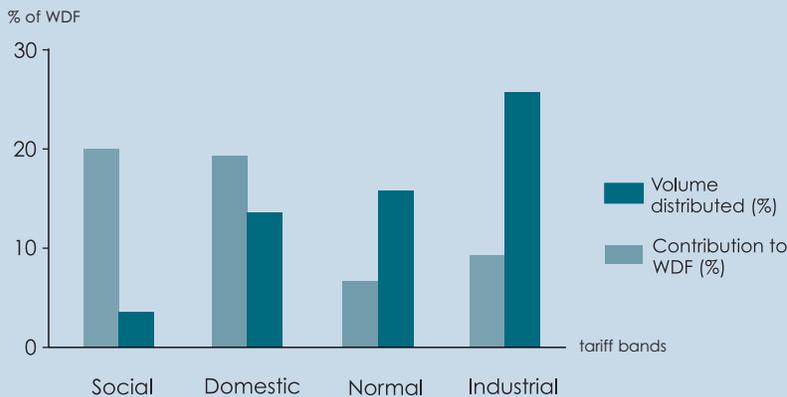


Figure vii

Source:  
Primary data collected from  
SODECI, 1992-1998

- The number of low-income households sharing a connection** Households sharing a connection often do not benefit from a social block and are penalized by the rising block tariff. As the social block typically designed for an average middle-income household, the total volume consumed by a group of households is likely to be significantly higher, pushing their consumption into a higher tariff block. Similarly, households that sell water to their neighbors are also billed in the higher tariff blocks. To avoid this, utilities in Ethiopia, Ghana and Tanzania charge a flat rate for common area (multi-household) connections; and in Nairobi a bulk rate is charged per cubic meter for water purchased by kiosks. In Durban, consumption on a shared connection would easily exceed the 6m<sup>3</sup>/month provided free of charge for a single household. Customers sharing a common compound or building are thus able to apply for several private connections in order to benefit from the tariff policy.
- The levels at which the tariff blocks are set** The effectiveness of a cross-subsidy can also be measured by the level of financial transfers between blocks. Increments between blocks in the tariff are particularly high in Burkina-Faso, Senegal and Mauritania. When the blocks in the tariff are not synchronized with

consumption patterns, the majority of consumers may fall into the social band because the amount of water provided is above the basic requirement for an average household. Alternatively, the cost of water in subsequent bands may be so high that it forces those who would normally have consumed water in the higher bands to look for alternative sources. The tariff should be sufficiently progressive to allow adequate transfers from one band to another.

- The proportion of water sold in higher tariff bands** In order to establish a cross-subsidy from high consumption (typically better-off) to low-consumption (typically poor) customers, it is necessary to ensure that a sufficient number of customers are consuming in the higher blocks of the tariff. Where the number of low-income consumers far exceeds those in other categories, the tax burden on the small number of customers that consume at higher tariffs may become too onerous. In the case of Côte d'Ivoire illustrated in Figure vii, 9% and 13% of the water consumed between 1992 and 1998 respectively was invoiced in the 'normal' and 'industrial' bands, thus contributing 22% and 36% to the WDF. Similarly, in Durban in South Africa, where the utility provides all consumers with a lifeline supply free of charge, it then accounts for the cost of this water in the higher bands of the tariff.
- The proportion of the social block allocated to the monthly standing charge** Providing a subsidized 'social block' is only effective as a strategy for targeting low-income households if the fixed part of the bill (such as the standing charges, the rental of meter or the minimum consumption level) is minimized and thus represents only a small sum within the block. Alternatively, this amount could include a fixed and adequate allocation of water of less than 3-4m<sup>3</sup> per month for the social block to function effectively. In Guinea and Tanzania, for instance, fixed charges represent the majority of the subsidized tariff band and the likelihood of low-income consumers benefiting from the social band is low.

### Establishing a flat rate for small or low-income consumers

Most utilities aim to install meters on all or most connections. However, due to meter tampering, faulty meters (caused by intermittent supply or poor water quality), inadequate maintenance, or even as a matter of policy and economy, some utilities charge fixed or flat rates for a large number of their customers. In Accra for instance, about 40% of households pay a flat rate for their water, irrespective of consumption.

Figure viii

**Domestic Flat Rate Charges in Kano, Nigeria**

Domestic Customer Categories	Tariff US\$/month
House with single tap - 1 family	3
House with single tap - multiple households	4
House with water system reticulation	5
Special compound (high cost residential areas)	15-50

Source:  
Iliyas and Sani, 2000

Although flat rates are often perceived as resulting in high levels of unnecessary and wasteful consumption, the use of a flat rate may be appropriate when connection costs are high (a minimum of US\$30 for the meter, plus connection, pipe fitting and

**The use of a flat rate may be appropriate when connection costs are high and consumption levels are low.**

meter installation), and consumption levels are low (i.e. when the costs of meter reading, billing and management do not justify installation of a meter).

The fixed/flat rate system can be elaborated by utilities applying a range of different rates to customers according to their standard of living. Indicators (such as the number of sinks and toilets, the plot size and location and the number of households sharing the connection) determine the rate at which a customer is charged. In the case of Kano, in Nigeria, illustrated in Figure viii, domestic connections are billed using a flat rate system. Rates are set at predetermined levels for a number of domestic categories (based on income levels) but commercial and industrial customers are metered. While this system can be useful and remove the need for expensive metering, this kind of usage assessment may become, or be perceived as being subjective and result in disputes with customers.

Whenever a flat rate is used, utilities should also establish measures to limit consumption to reasonable levels. In Durban, flow restrictors were installed on household connections that were billed flat rates. Demand management programs, illustrated in the case of Durban in Box 2, have been established to build consumer awareness of the need for conservation and have been carried out in several African cities with support from the Water for African Cities project managed by UN-Habitat.

The key pricing policy issues for serving the urban poor are discussed further in Section 7.3.

### **3.5 Develop appropriate payment mechanisms**

To ensure that low-income households stay connected, payment arrangements should be designed to help households pay their bills when they have the money on hand rather than on a bi-monthly basis as is common in most countries. Low-income households are remarkably effective at controlling finances on a daily or weekly basis, but have difficulty dealing with longer billing periods that do not correspond with the timing of their income (daily, weekly, or irregular). This requires them to make payments that have accrued significantly over several weeks. The monthly and bi-monthly or quarterly payment period may suit middle and high-income users that are paid on a monthly basis but this is rarely appropriate for low-income users. It places significant strain on household budgeting and expenditure.

In order to discourage late payment or non-payment of bills, utilities often implement enforcement procedures such as: (i) levying a penalty; (ii) disconnecting the defaulter; or (iii) terminating the supply and retaining the customer's deposit. Households with financial difficulties, even of a temporary nature, are therefore heavily penalized. This is particularly demoralizing for low-income households and unnecessary if simple alternative measures could have been employed to allow them to remain connected.

Despite these difficulties, many countries and cities continue to implement a relatively infrequent billing regime and have not introduced any measures that would assist low-income households to make their payments. Currently, billing is carried out on a bi-monthly basis in Senegal, Mali, Cameroon and bills are issued on a quarterly basis in Côte d'Ivoire. In Nairobi, where billing is carried out on a bi-annual basis, low-income consumers note that infrequent billing is a key reason why they default on payments (and are subsequently disconnected).

Accordingly, a number of approaches should be considered to facilitate improved payment. For instance:

**Flexible payment arrangements** • In order to reduce disconnection rates and ease the burden on low-income households, greater flexibility in the approach to payment should be introduced to enable households to pay their water bills in a manner more suited to their household budgeting and expenditure. Efforts should be made to investigate what options are relevant to the local context, for instance:

- increasing the frequency of billing;
- allowing several smaller payments against a single bill; and
- introducing intermediate billing based on consumption patterns (and thus removing the cost of meter-reading and management).

**Pre-payment arrangements** • Pre-payment arrangements can be established to encourage consumers to restrict their use to what they have paid for. In South Africa, pre-payment meters are being tested on a large scale. Results have been mixed with initial lessons indicating that technological solutions alone may not be sufficient (several of the meters have been vandalized and others re-programmed to supply water free of charge).

In addition to pre-payment arrangements based on electronic card systems or more simple tokens, it is possible to introduce measures that allow consumers to make more frequent payments through banks and savings institutions. While deposits (of any kind) act as a form of prepayment and alleviate the need for penalties as a means of enforcing payment, the upfront deposit may form yet another barrier for a low-income household (without them having defaulted) as it requires them to make a lump sum payment that may be beyond their means.

**Favorable payment terms for accumulated arrears** • Other mechanisms that can assist low-income customers include efforts to negotiate friendly payment terms for accumulated arrears. In particular, by allowing consumers to pay outstanding bills in installments, low-income households can remain connected and spread payments into periods when they are more financially stable. For instance, low-income households may be more able to pay at particular times in the year due to the seasonality of their work. Although it is currently informal, some regional branches of SODECI in Abidjan allow installment plans in small towns.

**Easier access to payment centers** • Establishing local payment centers in low-income areas may also facilitate payment by improving proximity of payment sites to customers. Typically low-income households live in marginal areas on the periphery of cities and utility payment centers are located a significant distance from the residence or place of work. Paying bills may mean taking time out of work. More careful consideration of the constraints that low-income households face (especially when they are trying to make payments) is likely to lead to better cost recovery.

**Improving billing accuracy** • Reducing wastage and the losses incurred through leakages is also an important means to improving rates of payment. Understandably all households are unhappy to pay for water they did not consume. Customers in low-income areas may receive bills that reflect malfunctioning installations (such as taps, appliances and meters, due to infrequent or poor maintenance). In unplanned areas where networks may have been installed by customers using sub-standard

**Payment arrangements should be designed to suit the requirements of low-income households.**

materials, leakage and wastage are currently the primary causes of high bills, leading to non-payment and disconnection. Initiatives include network infilling programs that enable households to replace 'spaghetti' pipelines with more reliable and closer connections, more frequent meter reading, increasing customer awareness, facilitating checks and repairs and carrying out demand management and water conservation programs.



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Mukami Kariuki