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Full Length Research Paper

Accessibility of water services in Kisumu municipality, Kenya

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One of the key challenges to the developing countries is increasing access to safe water supply to the rapidly growing urban population, consequently, billions of dollars have been invested in pursuit of the goal of "universal service" and yet the realization of that goal is still elusive. Based on cross sectional survey and purposive sampling of 367 households, this paper examines the level of accessibility to privatized water services in Kisumu Municipality. The Kenyan study shows that the proportion of households with access to piped water supply within a distance of 200 m is 77.1%, only 65.6% of the basic water requirements of the residents are met and that only 25% of the households access the minimum recommended 50 l/c/d. The low income households and low levels of investment in water infrastructure are related to reduced access to water services. Expanded access to safe water services may only be realized if upfront investment is made on rehabilitation and extension of existing water network in addition to upgrading of treatment plant, thus reducing the cost of maintenance and unaccounted for water and making better use of economies of scale. New water ethics and demand-based service delivery should also be adopted for better management and services.

Key words: Accessibility, water services, household income, Kisumu, Kenya.

INTRODUCTION

At the 2000 Millennium Summit held in New York, member countries of the United Nations unanimously agreed on a set of 8 goals to reduce poverty by 2015: among which is reducing by half the proportion of households that do not have access to safe water (Galiani et al., 2005). According to UNDP (2006) 2040 is a more likely date for this goal to be reached in Africa unless there is accelerated investment in the sector. By estimating the proportion of general population accessibility to piped water at home, the estimate also provides an estimate of the number of people (without such access) potentially exposed to water-related health risks. In spite of decades of government and donor-supported investments in the water supply and sanitation, public utilities in many African countries have been unable to fully meet the demand for water and sanitation services (Asingo, 2005). Africa has the lowest water supply and sanitation coverage in the world. Coverage levels stand at 62% for water supply and 60% for sanitation (WUP, 2002). In Kenya, access to safe drinking water is estimated at 68% in urban areas and only 49% in rural areas (Go, 2005). While most countries have committed to increasing access to safe water, there is little consensus on how to actually achieve this goal (Birdsall and Nellis, 2002). In general, international consensus exists that the private sector has a role in the provision of urban water and sanitation services (Njiru, 2004). Governments who want to privatize water systems are typically motivated by potential efficiency gains. They hope that these efficiency gains will be translated into expanded access and enhanced service quality and thereby improve health outcomes (Asingo, 2005). World Bank (2005) observes that poor access to water supply is often a result of poor policies and management practices; however, there is significant disagreement over the approach to addressing the problem. World Bank (2003) argues that a first and crucial step towards improving

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water situation and its management is to treat water as an economic good. The Economist argues that the problem "above all, is that it has been colossally underpriced and that to meet the target of halving the proportion of people without access to clean water money will play a part. Water is therefore viewed as an economic as well as social good. But greater reliance on pricing and markets are even more crucial" (The Economist July 19-25, 2003).

Water is a basic need and human right and as such modern governments have the responsibility of ensuring that it is available, accessible, adequate, safe and affordable. Across the globe, there has been an increasing trend towards privatization of public utilities. The trend is for the local governments to relinquish some or all their control over the design, construction, ownership and operation of water services (Segal, 2001). In addition, if water becomes a private commodity, economically poor communities may be priced out of the water market. While public entities have good reasons to consider social equity and affordability, private corporations, in their desire to increase profits and operational efficiency, may not. Several case studies have documented inequity in water service and quality between high income and low income of the majority neighbourhoods (Mann, 1993). The neoliberal solution to problems in the water sector has been privatization. However experiments of more than a decade have shown that privatization of water services was a poor policy prescription, involving spectacular failures (UNDP, 2006). Problems have been associated with the difficulty of establishing competitive market structures (Estache et al., 2005; Kessides, 2004; Kirkpatrick et al., 2006), ineffectiveness of regulation in the presence of information asymmetries and incomplete contracts (Martimort, 2006), and negative welfare effects (Bayliss, 2003; Dagdeviren, 2006). The privatization of water supply and sewage disposal is currently a political issue in many countries around the world (Shiva, 2002; Swyngedouw, 2004). It is highly contested because water is an indispensable good: to exclude people from access to drinking water means to deprive them of the basis of their existence; and a lack of access to sanitation systems is a threat to living quality because it can be the cause of serious diseases. What is involved here is the struggle between the logic of water as a public good that should be accessible to everybody independently of his or her purchasing power, and the logic of water as a commodity that is produced and sold under capitalist market conditions. While, in general, water sector reforms for improving efficiency service quality and access are welcome, heavy reliance on tariff rationalization without paying much attention to investment and maintenance needs could be a serious problem (Dagdeviren, 2006). Water sector crisis in Africa followed the recessionary conditions of the 1970's when many suppliers found themselves in a financial vicious circle caused by a decline in government funding of capital expenditure, low tariffs, low billing, low revenue collections and increasing demand for water (Shirley, 2002). Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and Development in Kenya (Go, 1999), tackled issues pertaining to water resources management, water and sewerage development, institutional framework and financing of the sector. Accordingly, the Water Act Cap 372 underwent various amendments which resulted to the Water Act 2002 which became operational on the 18th March 2003. The Act has therefore seen local authorities form municipal water companies, which operate on strict commercial lines, for example Kisumu, Nairobi, Nyeri, Eldoret and Mombasa among others, have all privatized their water and sanitation services and formed companies to manage them and number of local authorities are in the process of establishing their water companies.

This paper aims to demonstrate that the stated policy of increasing the proportion of people with access to safe water through privatization of water services is likely to be unattainable with small and ageing distribution network. The paper assesses the accessibility to water services by income categories of the residential estates. The study examines households' accessibility in four residential estates in Kisumu City-Milimani-high income, Migosi-middle income, Arina - low income planned and Nyalenda - low income unplanned. Detailed assessment has been made on proportion of households with safe water supplies, primary sources of water for each estate, the daily household and per capita water use. Finally, recommendations have been made on interventions for increasing accessibility by households under privatized delivery regime.

STUDY AREA

The study is based on a case study of privatized delivery of water to urban residents in Kisumu Municipality, Kenya. Kisumu, the third largest city in Kenya has annual population growth rate of 2.8% (Go, 1999), The City is occupied predominantly by low income households, with more than 50% of the population categorized as poor. It is surrounded by an agriculturally rich hinterland with large scale sugar industry and rice irrigation. Kisumu Municipality is located in Kisumu East District, which is within the Lake Basin Development Authority region, a spatial extent covering about 5% of the total land area in Kenya. The town, which has been designated as a regional growth node, is connected to nation and the region by four major roads. The major routes are Nairobi Road to the southwest of the town, which connects Kisumu to Nakuru, Nairobi and Mombasa. To the north is a connection to Kakamega while to the west is a connection to Busia. The Busia route provides an alternative road to Uganda via Kisumu. The forth road

Table 1. Sampling frame.

Income category	Total no. of households	Selected households	Percentage
High income (Milimani)	1302	55	15
Middle income (Migosi)	2012	86	23.4
Low income planned (Arina)	575	33	9
Unplanned settlement (Nyalenda)	4694	193	52.6
Total	8583	367	100

into Kisumu is a small connection to Kibos and Muhoroni to the east of the town. Kisumu is also connected to Nairobi and Mombasa by a major rail link. The accessibility to water services is below the national average despite close proximity of World's second largest fresh water lake.

METHODOLOGY

The study was based on Kisumu Municipality and employed stratified random sampling to select the estates to be studied. The residential areas surveyed during the study were categorized into four strata, namely, high income (Milimani), middle income Migosi), low income planned settlement (Arina) and low income unplanned settlement (Nyalenda). The total number of households in the selected estates was 8583. A stratified random sample of 367 households which represented 4.3% of all the households was selected. The following formula was used to determine sample size;

$$n_f = \frac{n}{1 + n/N}$$

Mugenda et al. (1999)

Where n_f = the desired sample size when the population is less than 10,000.
N = the desired sample size (when the population is more than 10,000).
N = the estimate of the population size .

$$n_f = \frac{384}{1 + 384/858} = 367$$

An enumeration map was used to identify the households from the sampled areas. Accessibility was measured in terms of the proportion of the households with access to adequate amount of safe drinking water in a dwelling or located within a distance of not more than 200 m from a house to a public stand post. A structured questionnaire was administered by the researcher to the household heads to collect data. The selected households were distributed proportionally picking 4.3% of the households in each estate as shown in Table 1.

The study used both primary and secondary sources of data. These were drawn from the field, libraries, internet and various institutions like KIWASCO, Lake Victoria South Water Service Board, Water Resources Management Authority, Municipal Council of Kisumu and NEMA among others. The research employed qualitative and quantitative techniques of analysis. Medina (1998) observes that by combining the two techniques, social scientists balance the strengths and weaknesses of the two and will achieve a higher degree of reliability and validity, compared with the use of only one. The number of household connections and the distance to the nearest piped water point was used to assess the level of accessibility to safe water. This was expressed as a proportion of the households with access to safe water. The daily per capita water consumption (l/c/d) was used to assess the extent to which basic water requirement is met in Kisumu Municipality. The differences in mean l/c/d have been tested using ANOVA Technique, while the relationship between water use and income was tested using correlation analysis. The level of accessibility was measured by the proportion of with access to adequate and safe water supply.

RESULTS AND DISCUSSIONS

Reforms in the water sector

The Government of Kenya has recognized the provision of clean, portable and affordable water as an integral part to economic growth (Go, 2001; Medina, 2007). It is in recognition of this fact that the government is implementing fundamental reforms to address the challenges in the water sector. The purpose of the reforms is to improve the management of water resources; improve access to water and sanitation services; enhance accountability for water resource management through decentralized provision of service and improve utilization of water resources (LVSWSB, 2008). Sessional Paper No.1 of 1999 on National Policy on Water Resources Management and Development tackled issues pertaining to water resources management, water and sewerage development, institutional framework and financing of the sector. Accordingly, the Water Act Cap 372 underwent various amendments which resulted to the Water Act 2002 which became operational on 18th March, 2003. The sessional paper underscores the principle and recognition of the fact that the private sector offers invaluable potential, which has not been fully harnessed to contribute to sustainable development of the water sector. The paper sets out the framework that is intended to bring about the culture that promotes comprehensive water resources management and development with the private sector and community participation as the prime movers in the process to guarantee sustainability (Go, 1999). The Water Act 2002 broadly set out the legal implementation framework for the policy of privatization in the water sector. The Water

Act 2002 provides the legal framework for the management and development of water services. It aims to address the weaknesses that face the water supply by separating policy functions from regulation and services. It further separates service delivery functions into asset holding and investment (water services board function) and water and sanitation services provision (water service providers function). The Act has therefore seen local authorities form municipal water companies, which operate on strict commercial lines. In Kisumu, Municipal Council of Kisumu under the Companies Act Chapter 486 of the Laws of Kenya, established a water company by the name Kisumu water and Sewerage Company (KIWASCO) in 2001 but became operational in 2003. KIWASCO's mandate is to effectively and efficiently provide adequate water to customers and collect, treat and dispose sewerage in a safe and environment friendly manner (KIWASCO, 2007).

The government is implementing reforms in the sector to restructure and improve sector performance and address the problems associated with the management of the resources and the delivery of water and sewerage services. The key institutions in the water sector include:

- Ministry of water and irrigation (MWI) - Responsible for policy development and implementation, sourcing finances, supervision of water sector institutions.
- Water Resources Management Authority (WRMA) - Responsible for regulation of Water Resources issues such as water allocation, source protection and conservation, water quality management, and pollution control.
- Water services regulatory board (WSRB) - Responsible for regulation of water and sewerage services provision, including issuing license, setting service standards and guidelines for tariffs and price, providing mechanisms for handling complaints.
- Water services board (WSB) - Licensed by the WSRB to be responsible for the efficient and economical provision of water and sewerage services within its area of jurisdiction. Seven WSBs have been gazetted and established to cover various regions in the entire country. Under the Water Act 2002, the WSB is the asset developer and holder. It is the responsibility of the WSB to develop and give the assets to the service providers to use and maintain for the provision of services. However, direct provision of water and sewerage is undertaken by water service providers (WSPs) which are agents of WSBs except where the WSRB is satisfied that the procurement of such agents is not possible or that provision of services by such agents is not practicable (Go, 2007). The WSPs may be community groups, non governmental organizations (NGOs), autonomous entities established by the Local Authorities or private sector.
- Water services trust fund (WSTF) - Assists in financing the provision of water services to areas without adequate water services.
- Water appeals board (WAB) - Responsible for the determination of appeals and disputes.

KIWASCO was transferred from the municipal council under the service provision agreement. Under that agreement, the company was to provide water within an area of 279 km^2 the area covered by the municipal boundary. Also under the same agreement the assets were also transferred to the company under the lease agreement. The company pays a lease fee of Kshs.1,500,000 and Kshs.1,000,000 debt resolution per month to the municipal council because the assets and all staff below corporate management team all came from the council. The water company also pays a further regulatory levy to WRSB calculated at the rate of 1% of the monthly revenue. KIWASCO also pays license fee to LVSWSB of 5% of their monthly revenue. Currently, KIWASCO realizes revenue collection efficiency of 93%.

Relationship between water use and income

From detailed household surveys on water use the study examined the extent to which the urban households are served by private water service providers and if water consumption increases by income levels of households. The respondents were asked to estimate the daily amount of water used by their households. To estimate the daily water use, the researcher asked the surveyed households their monthly water bills as issued by the water company, KIWASCO, where there is piped connection or the number of twenty-five liters jerry cans used per day, for those relying on vending systems or kiosks. The mean monthly household income for each residential estate for the year 2008 was computed from the reported individual household monthly income. Table 2 shows the mean monthly household income and the daily amount of water used per household in each estate. The analysis is based on the reported incomes and estimated quantities of water consumed.

The strength of the relationship between monthly household income and water use was tested using Pearson Correlation Analysis. The study used the reported mean monthly household income and mean daily per capita water use in each estate. Using the data in Table 2, the correlation coefficient was computed. The results show that the coefficient of correlation denoted by r is 0.992 at 95% confidence level. This shows strong positive correlation between household income and daily per capita water use. Households in high income estates exhibit higher demand for water per day than the low income residents, hence the higher the income, the higher the water consumption and vice versa.

Daily per capita water use

In Kisumu City, Kenya, the mean household water consumption is 149.50 l per day, resulting in a mean per

Table 2. Estimated mean daily amount of water used per household (Liters).

Name of estate	Mean monthly household income (kshs)	Mean daily water used(litres)	Mean family size	Mean per capita daily water use (litres)	Deviation from the recommended basic water requirement
High income	26,650	205.00	3.64	56.32	+6.32
Middle income	17,950	167.29	4.31	38.82	-11.18
Low income	16,750	177.32	4.32	41.05	-8.95
Unplanned settlement	7,150	112.48	5.01	22.45	-27.55
Mean	17,125	149.50	4.54	32.92	-17.18

Table 3. Domestic Per Capita Consumption by Housing Class for Selected Countries.

Housing class	Description	Water consumption litres/capita/day
High income	Detached houses, luxury apartments having 2 or more and 3 or more taps per household	150 - 260
Middle income	Houses and apartments having at least 1 WC and 2 taps per household	110 - 160
Lower income	Tenements, government rehousing, shared houses, having at least 1 tap per household but sharing WC	55 - 70

Values are for Turkey, Saudi Arabia, Egypt, Indonesia, Hong Kong and Bolivia.
Source: Connal (1982) as cited Dangerfield (1983).

capita of 32.92 L per day as shown in Table 2. According to a study by World Bank (2005), the daily per capita water use in Kenya is 45.2 L. Using the recommended basic water requirement (bwr) of 50 l/c/d (World Bank, 2003; Gleick, 1996) in the study area, there is a mean daily water per capita shortfall of 17.18 l. From the recommended bwr and the actual per capita water use the shortfall represents 34.4% of daily per capita water requirement. This implies that only 65.6% of the basic water requirements of the residents of Kisumu Municipality are met. The data from Table also indicate that the per capita daily water use varies according to the income category of the estates. For example, in high income Milimani Estate, the consumption is 56.32 l/c/d while the low income unplanned Nyalenda Estate reported the lowest water use of 22.45 l/c/d, which is 27.55l/c/d below the recommended bwr compared to selected countries in Table 3. The per capita water use in the high income is therefore about 2.5 times more than the poor households in Nyalenda Estate. Incidentally, Migosi Estate, although categorized as middle income estate, the l/c/d is lower than the low income Arina Estate. This is due to limited piped water connections and lack of water kiosks in Migosi estate. This suggests gloomy picture for Kisumu City. The low per capita daily water use in Kisumu city is a reflection low level accessibility and low capital spending in the sector compared to the increase in urban population and extension of municipal boundary. Mean daily per capita water use, generally shows downward graphical trend, with low income estates reporting lower daily per capita water use (Figure 1). The study found out that the low and middle income estates access less than 50% of the recommended basic water requirement as shown in Figure 1.

The results in Table 2 indicate that only 25% of the households in the study area therefore access the 50 l/c/d recommended bwr for drinking, cooking, and personal hygiene. This has serious health implications as is evidenced by the prevalent water related diseases in the study area (UN Habitat (2005). The water requirement of the urban residents is still far from being met. Kisumu City has been suffering serious water shortages since the 1980's (JICA, 1998). There has been a steady increase in population since then with no expansion in supply capacity. As a result, the water deficit has continued to grow. The current projected water production is 18,000 m^3, while the present demand is estimated to be 48,000 m^3 (KIWASCO, 2007) had projected production to increase to 67,800 m^3 by the year 2005 but this did not take place. This indicates a big short fall which must be met by other sources. Water vending is an important service and business in Kisumu Municipality. In terms of level of economic development, Argawal (1981) observes that in third world countries where piped connection is scarce, people only use about 4 to 38 L of water per person per day while in cities in

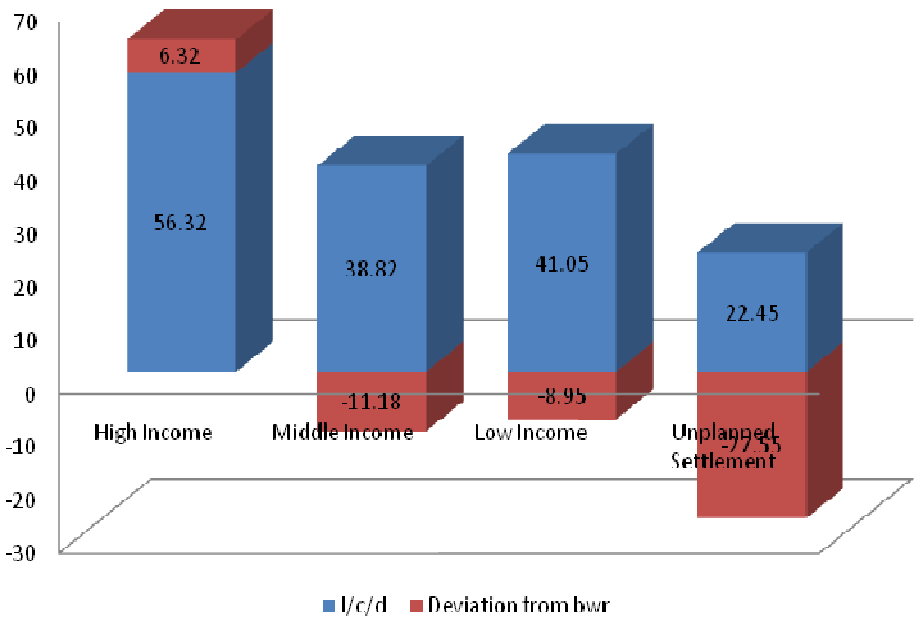

Figure 1. Mean daily per capita water use.

developed countries, people consume about 83 to 227 l/c/d. Estimates of total domestic water use for selected Asian countries show a range of about 10 to less than a 100 l/c/d. Cambodia consumes the least at 9.5 l/c/d. On regional averages, the Western Pacific region reaches a high of 95 l/c/d. The world average water consumption for developing countries ranges from 35 to 90 l/c/d (Argawal, 1981). Comparisons with Tanzania and Uganda reveal the following; although water use in urban Kenya is only marginally lower than the 47 l/c/d estimated for the urban Uganda in the World Bank (2005) study, it is 60 - 70% lower than in neighbouring Tanzania, where the average water use in urban areas is about 71 l/c/d. And it is even lower when compared with water use levels reported for several non-African cities in the developing world. The Latin American Cities average water use range between 143 - 237 l/c/d. Similarly water use in 13 Asian cities was found to be in the range of 91 - 209 l/c/d.

Hours of water service

With regard to hours of service Table 4 shows 30% of the connections have 18 - 24 h supply while the rest get water through rationing. The average number of hours they get water is 6 h. Access to water has been reasonably good and considerably above the average in high income Milimani and unplanned Nyalenda estates. None of the estates receive 24 h continuous supply. Contrary to the popular belief that water companies are reluctant to provide water in the informal settlement because the financial returns are negligible, unplanned Nyalenda estate is better served than the middle income Migosi and low income planned Arina estates. KIWASCO rations water supplied to various consumers. Table 4 shows that 11.8% of the respondents receive water for less than 6 h a day, 10.1% receive water for 6 -18 h a day and only 30.4% of the households receive water the whole day. The study found out that only 1.4% of households in the middle income Migosi Estate that receives water, the supply are for less than 6 h. The remaining 98.6% of the households depend on water vendors for their domestic needs. The whole day service by the vendors shows the strong power of the private supply of water. It may therefore imply more reliable, round the clock supply by private market compared to semi-private water company.

The unplanned low income Nyalenda Estate appears to have the longest hours of water service, with 65.3% of the households receiving water for 18 - 24 h. It should be noted that most of these households rely on water kiosks (Figure 4). The high income Milimani Estate even though it has nearly 100% private piped water connection, only 56.1% of the households receive water throughout the day and 22% of the households receive water for less than 6 h a day. The Unaccounted for Water (UFW) is the biggest challenge KIWASCO is facing (KIWASCO, 2007). KIWASCO believes that the rehabilitation project will mitigate this.

The company looses about 66% of what is produced. Kisumu suffers high rate with a UFW of 66%. In other words, well over half of the water treated and distributed by KIWASCO does not reach consumers or does not result into revenues for the company. This is down from

Table 4. Hours of water service.

Name of estate	Number of Hours of water service per day			
	Less than 6 h (%)	6 - 12 h (%)	12 - 18 h (%)	18 - 24 h (%)
Millimani	22.0	.0	2.4	56.1
Migosi	1.4	.0	.0	.0
Arina	15.7	1.4	10	.0
Nyalenda	8.0	5.3	20.7	65.3
Mean	11.8	1.7	8.4	30.4

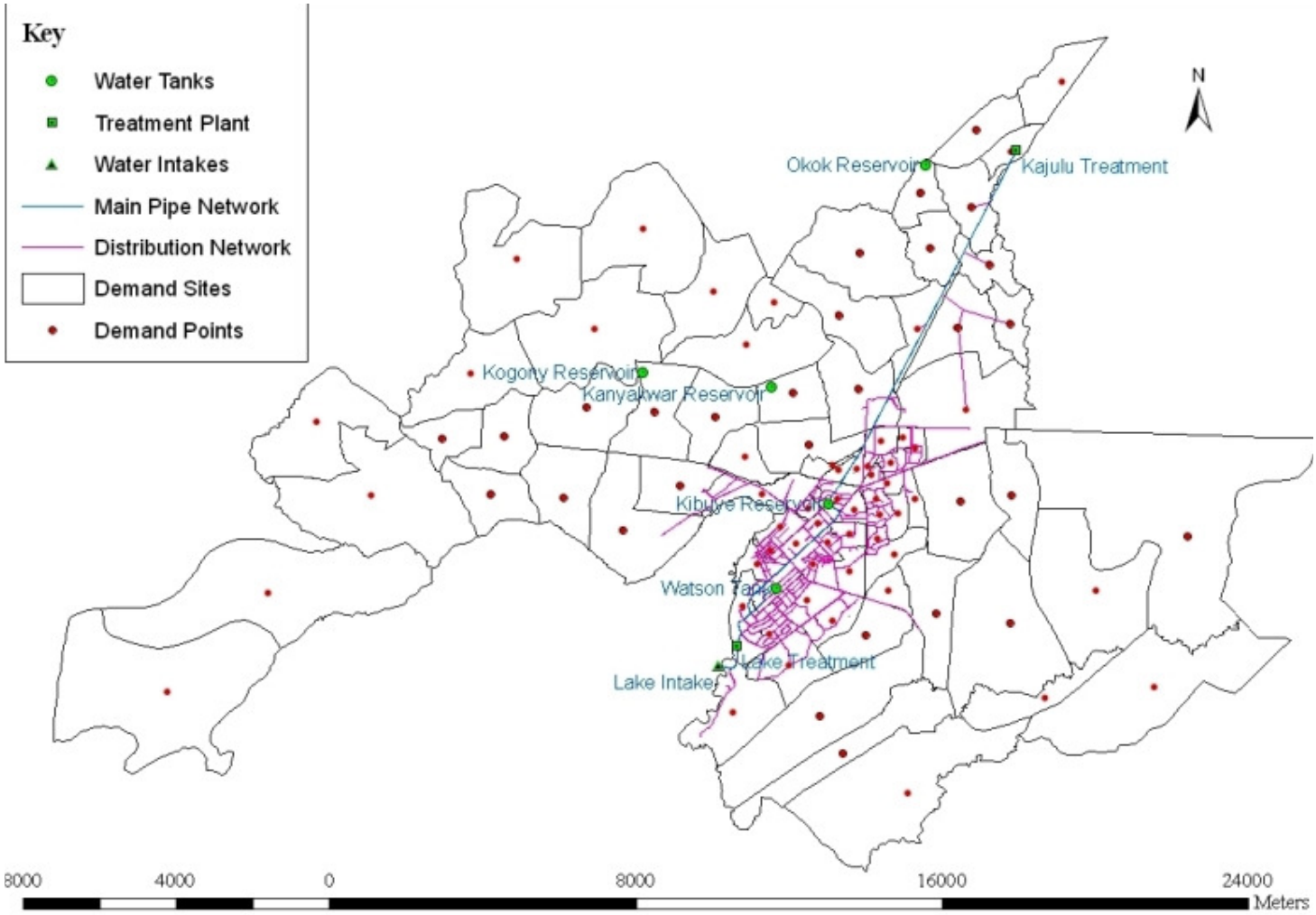

Figure 2. Water supply zones in Kisumu city.

the 78% it inherited from the municipal council. The company has set a target of 2% per month reduction in UFW. UFW in a well run utility tends to fall between 15 - 20% (World Bank, 2005). The high UFW implies that the water company earns revenues for less than 40 per cent of their production on average; since more than half of the water they produce is not billed and the amount billed is not fully collected. The small size of the system and the ageing infrastructure in Kisumu City, have inflated the unit costs of accounted for water partly through high "Unaccounted for Water" rates over time. The major causes of UFW include, leakages in the system due to lack of maintenance and dilapidated infrastructure, water theft through illegal connection, water wastage as result

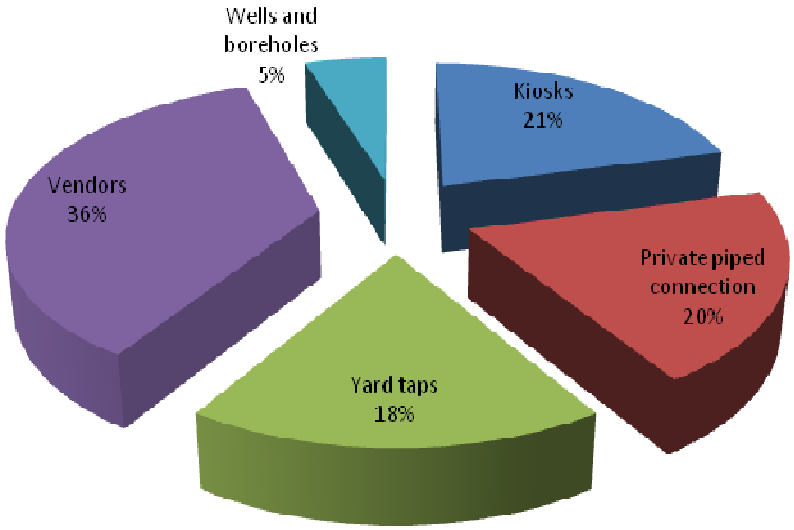

Figure 3. Primary source of water in Kisumu city.

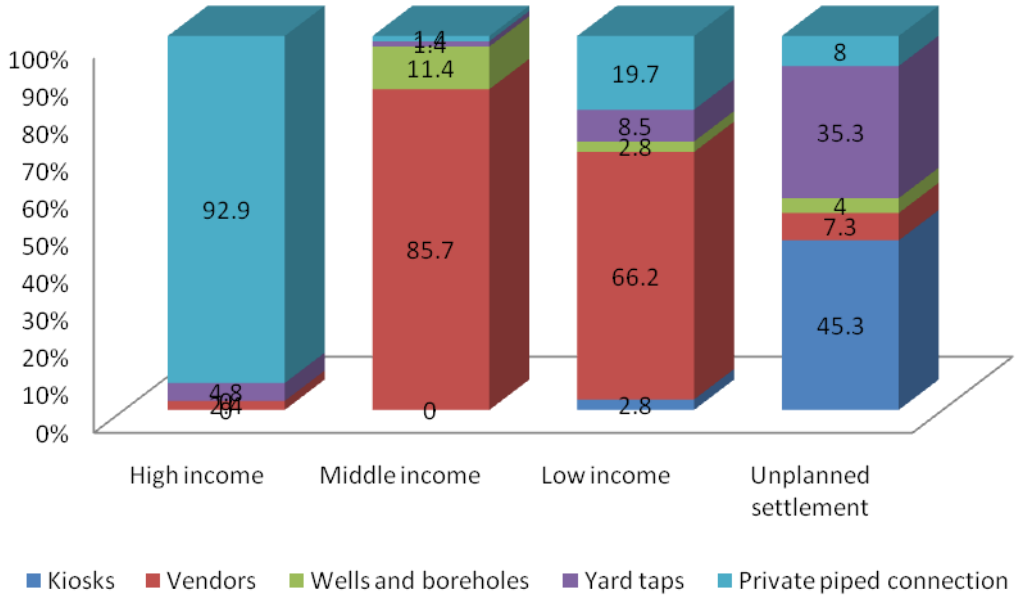

Figure 4. Sources of water by residential category.

of unmeasured consumption coupled with fixed payment since 26% of the connection are inactive. There is also vandalism of the distribution network (KIWASCO, 2007).

Distances to the nearest primary water source

Households in Kisumu City travel varying distance to access safe water as shown in Table 5. The current water supply network and sewerage system commands 40 and 10% spatial coverage, respectively, mainly concentrated within the built-up urban centre (KIWASCO, 2007). The average distance to the primary source of water indicates that only 24% of the households have water within their houses.

The study revealed that 53.1% of the households access water outside their houses but within 200 m distance while 22.8% of the households have to walk over 200 m to reach the nearest source of water. The mean distance to the nearest water source varies in each of the estates, with high-income Milimani estate having the highest in-house connections (90.5% of the

households) and only 9.5% getting water from outside their houses. Middle-income Migosi Estate has the least private connections (only 8.6% of the households) while the rest rely on wells and water vendors. In low - income Arina Estate only 23.9% of the households have in-house connections while in unplanned Nyalenda Estate, the residents largely rely on water kiosks, and a paltry 12.7% have private connections.

The study therefore found out that 77.1% of the households access water within a distance of upto 200 m or less. The study further found out that the unplanned low income Nyalenda Estate enjoys shorter distance to the nearest water source than low income planned Arina and middle income Migosi estates. This is because of the existence of many water kiosks in the unplanned low income Nyalenda Estate. The kiosks have been established at closer intervals hence reducing distance travelled by households to the nearest water points. Only 17.3% of the households in unplanned Nyalenda Estate travel a distance of over 200 m to reach the nearest water point compared to Migosi and Arina Estate where 38.6 and 32.4%, respectively, travel the same distance. Accessibility to water services is lowest in the middle income Migosi Estate due to none availability of private piped connections and water kiosks. The residents rely largely on the water vendors who transport water over longer distances. KIWASCO has established delegated water management model in the low income unplanned Nyalenda Estate by appointing master water operators who operate the kiosks and maintain the network along their system (KIWASCO, 2007). The delegated model has led to emergence of many water kiosks in the neighborhood thereby bringing water closer to the households. Figure 2 shows that while KIWASCO was to provide water within the entire municipal boundaries, so far the reticulation has been confined to the built up area.

The existing network is the old distribution system which was done by Kisumu Municipal Council. The vast area of Kisumu city therefore is not under distribution network. Distance to the primary source affects water consumption as well as socio-economic status of the households. Longer distances to the nearest water source imply longer hours spent on fetching water. The time spent on fetching water could be more productively used elsewhere. The weight of the water also affects health status of the people involved in fetching water who are coincidentally mostly women and children. Some residents are tempted to carry water on their own to save money on water expenditure. The residents can also resort to alternative water sources like wells which may be polluted, if the piped sources are far.

Primary source of water in Kisumu city

Households surveyed in the four estates of Kisumu Municipality use a number of water sources to meet their needs. Private in-house piped connection is the most important, yet only 19.8% of the sampled households use them as their primary source. An additional 18.6% of the households use yard taps as their primary source (Figure 3). In other words, 38.4% of the households in the four estates have access to piped water supply, either in their houses or in their yard. The study found out that 35.7% of the sampled households use the vendors as their primary source, while 21% rely on the kiosks as shown in Table 6. Therefore, 56.7% of the households in the four estates surveyed depend on either vendors or kiosks. Kiosk operators sell their water to both the vendors and household customers who therefore have to transport the water over varying distances. Figure 3 show that water vending is by far the most prevalent alternative to piped supplies, with 35.7% of the households using them as their primary source. The overwhelming majority of whom are from middle income Migosi Estate with 85.7% of the households relying on water vendors, followed by low income Arina Estate where 66.2% also use vendors as their primary source of water as shown in Table 6.

Kiosks and wells/boreholes serve as the primary source for 25.8% of the households. The reliance on water kiosks is more prevalent in the low income unplanned Nyalenda Estate where 45.3% of the households source their water direct from the water kiosks. The residents of Nyalenda Estate largely rely on water kiosks due to close proximity to the kiosks. Many kiosks have been established in Nyalenda Estate, in line with the principle of delegated management model. The prevalence of water kiosks and not house connection could be attributed to water culture where the water company still views the poor as unattractive investment /customers and the residents prefer to meet daily water costs as opposed to monthly bills. Utility coverage or the proportion of the household with access to piped water supply in Kisumu Municipality is only 43 per cent (Table 6) which is quite low. The number of connections is 10,800 and only 4,400 are categorized as active connections. Sixty percent are therefore faulty meters, which are being charged on average (KIWASCO, 2007). KIWASCO, through its Community Outreach Unit, has been sensitizing people to reconnect water. On average, 65 accounts are being reactivated every month. According to KIWASCO Strategic Plan, 2007, all the inactive accounts should be all reactivated by 2011. Specifically, in high income Milimani estate we find that 97.6% of the households, 2.8% of the households in middle income Migosi estate, 27.2% in low income Arina estate and 43.3% in unplanned Nyalenda estate have access to piped water supply, either through a private in-house connection or a yard tap. Water kiosks still remain a major source of water in Kisumu Municipality.

Although a small proportion of the households in Kisumu City have access to private piped water connection, the gap is bridged by kiosk operators and vendors who supply KIWASCO water. As one would

Table 5. Distance to the nearest water source.

Category of estate	Within the house %	Up to 200 m (%)	Over 200 m (%)
High income	90.5	9.5	.0
Middle income	8.6	52.9	38.6
Low income	23.9	43.7	32.4
Unplanned settlement	12.7	70.0	17.3
	24.0	53.1	22.8

Table 6. Summary of water accessibility situation in Kisumu city.

	High income (%)	Middle income (%)	Low income (planned) (%)	Low income (unplanned) (%)	Mean (%)
Recommended 50l/c/d	100	0	0	0	25
Distance within 200 m	100	61.5	67.6	82.7	77.1
Private piped connection or yard tap	97.6	2.8	28.2	43.3	43.0
Mean	99.26	21.4	31.9	42	48.4

expect, the level of service provided by alternative sources such as kiosk operators and vendors is also very low. The quality of the water is questionable and the vendor prices are normally higher than the utility prices. With only 19.8% as shown in Table 6 of the residents having access to main water connections, alternative sources are by far the most prevalent. The situation was more deplorable in middle income Migosi Estate where only 1.4% of the respondents interviewed have direct water connections, and in unplanned Nyalenda Estate, it is slightly better with 8 per cent of the respondents having direct connection while in low income Arina Estate, the figure stood at 19.7%. In Migosi and Arina Estates, the houses have network connections but most of the houses do not receive water. Still a large proportion of the population is relying on water kiosks. The study attempted to factor the above three parameters to assess the proportion of the households that can be considered to have access to water services as shown on Table 6.

Multi-assessment of accessibility to water services

Dangerfield (1983) observes that actual water consumption per capita varies with the mode of water connection. Households with water connections are reported to consume more, ranging from 100 to 150 l/c/d. For households who are getting water from hand pumped wells and carry the water over about 100 to 500 m and those getting from single stand pipes serving 250 to 500 persons, water consumption is much less at about 10 to 15% of those with piped connections. Some studies (e.g. Kirke and Arthur, 1984) observed that when water is carried over long distances or purchased from itinerant water-vendors, consumption even falls to about 5 l/c/d. When water is from a shallow well, the level of consumption ranges from about 5 to 28 l/c/d. If water is from public standpipes, consumption per capita per day ranges from 9 to 47 L. With an easier access to water supply, consumption tends to rise such that households with multiple taps consume between 28 and 283 l/c/d of water. Single tap households tend to consume between 57 and 94 l/c/d. The water use as Kisumu city appears to follow the trend in Dangerfield (1983) study.

Table 6 shows that when different parameters are used to assess the proportion of the households that have accessibility to water services, different figures result. The mean accessibility to water services in Kisumu City, based on the three parameters is 48.4%. If distance criteria is used the accessibility is 77.1 %, and if the recommended bwr criteria is applied then the level of accessibility to water in Kisumu City is 25%, while private piped connection shows 43% accessibility. Distance parameter is the most generous measure of accessibility while the recommended is the most conservative measure of accessibility (Figure 5). Table 6 also indicates that high income Milimani Estate enjoys the highest accessibility, with 99.26% of the households having access to water services. The middle income Migosi Estate has the lowest accessibility, with only 21.4 %. The proportion of households with access to water services in Arina and Nyalenda Estates are 31.9 and 42% respectively. Migosi Estate has the lowest connectivity due to non-existent or dilapidated networks while Arina and Nyalenda estates have relatively better accessibility due to the presence of water kiosks within the neighbourhoods. The Kenya Integrated Household Budget Survey (KIHBS, 2005) estimates that, access to safe water is 83% in the urban areas and 49% in the rural areas. The KIHBS criterion is based on the distance

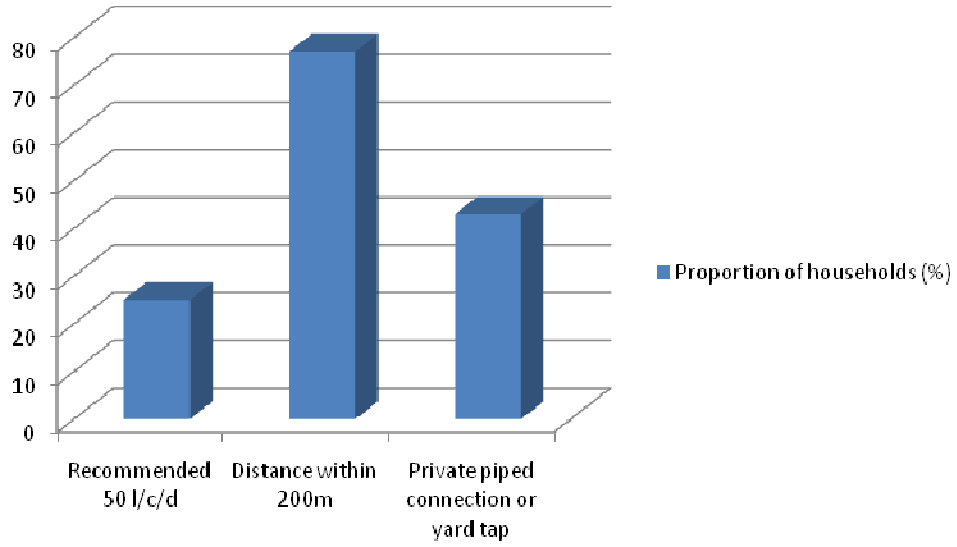

Figure 5. Accessibility to water using different parameters.

criteria. The foregoing figures imply that accessibility to safe water in Kisumu City is far below the national average. LVSWSB therefore has Herculean task to make the town realize their goal of adequate access to safe water in line with the MDG's.

CONCLUSION AND RECOMMENDATION

Access to safe water is a fundamental human right just like food, but it should be recognized that a right to water does not mean free water. Unless people value something properly, they tend to waste it. The proportion of households with access to safe water in the study area is quite low, below even the national average and the residents have to contend with multiple sources to meet the daily water demand. With this information on water use, the total water requirement of the households can be determined more accurately and the water company would have a better sense of how much water to produce.

The Government should aim to provide all households this basic water requirement for maintaining human survival and health. Basic human needs of water and sanitation should be enjoyed by all members of society regardless of financial circumstances. To expanded access to safe water services there is need for upfront investment on rehabilitation and extension of existing water network in addition to upgrading of treatment plant, thus reducing the cost of maintenance and unaccounted for water and making better use of economies of scale. Public investment in the water network could be the route to achieve reduction in unaccounted for water and hence increasing accessibility to safe water services. Cost recovery with poor infrastructure and small size of network seems a pipe dream.

REFERENCES

Argawal A (1981). "Water Sanitation and Health for All."
Arlene B, Inocencio JE, Padillaand EP, JavierArlene B, Padillaand E, Javier P (1999). Determination of Basic Household Water Requirements. pp. 99-02 (revised)
Asingo PO (2005). Privatization of Water in Kenyan Local Authorities: Governance and Policy Issues. IPAR. Nairobi p. 067.
Bayliss K (2003). 'Utility Privatization in Sub-Saharan Africa : A Case Study of Water. J. Mod. Afr. Stud. 41(4): 507-531.
Birdsall N, Nellis J (2002). "Winners and Losers: Assessing the Distributional Impact of Privatization" World Development 31(10): 1617-1633.
Dagdeviren H (2006). 'Revisiting Privatization in the Context of Poverty Alleviation: The Case of Sudan' J. Int. Dev. 18(3): 469-489.
Dangerfield, Bernard J (1983). Water Supply and Sanitation in Developing Countries: Water Practice Manuals. London.
Economist (2003). Priceless: A Survey of Water pp. 19-25.
Estache AS, Perelman S, Trujillo L (2005). Infrastructure Performance and Reform in Developing and Transition Economies: Evidence from a Survey of Productivity Measures. Washington D.C. Policy Research Paper p. 3514.
Galiani S, Gertler P, Schargrodsky E (2005). 'Water for Life: The Impact of the Privatization of Water Services on Child Mortality', J. Polit. Econ. 113(1): 83-120.
Gleick PH (1996). Basic Water Requirement for human Needs. Pacific Institute for Studies in Development, Environment and Security. Water International, 21 Oakland, CA94612 USA.
Go K (1999). Sessional Paper No. 1 on National Policy on Water Resources Management and Development. Government Printers,
Go K (2001). Poverty Reduction Strategy Paper for the Period 2001-2004. Government Printers, Nairobi.
Go K (2007). Kenya Vision 2030. A Globally Competitive and Prosperous Kenya. Government Printers, Nairobi.
JICA (1998). Towards Sustainable Water Supply and Sewerage Services in Kisumu Municipality. Study Commissioned by Kisumu
Kessides IN (2004). Reforming Infrastructure: Privatization, Regulation and Competition. Oxford and New York: Oxford University Press for the World Bank.
Kessides IN (2004). Reforming Infrastructure: Privatization, Regulation KIHBS (2005). Kenya Integrated Household Budget Survey.
Kirke J, Arthur J (1984). Water Supply Issues," In Basic Needs and the Urban Poor. ed. by P. J. Richards and A.M. Thomson, Biddles Ltd. Guildford, Surrey, England.
Kirkpatrick C, Parker D (2006). Domestic Regulation and the WTO: The

Case of Water Services in Developing Countries. World Economy 28(10): 1491-1508.
KIWASCO (2007). Kisumu Water and Sewerage Company Strategic Plan 2007-2012.
LVSWSB (2008). Strategic Plan.
Mann PC (1993). Water Utility Regulation Rates and Cost Recovery Proceedings of the Seventh NARVC Biennial Regulatory Information Conference: Columbus, Ohio.
Martimort D (2006). An Agency Perspective on the Costs and Benefits of Privatization. J. Regul. Econ. 30: 5-44.
Medina M (1998). Border Scavenging, A case study of Aluminum Recycling in Laredo Resources, Conservation and Recycling. Elsevier Science, Philadelphia.
Mugenda OM, Mugenda AG (1999). Research Methods. Quantitative and Qualitative Approaches, African Centre for Technology Studies (ACTS). Nairobi, Municipal Council, Nairobi.
Njiru C (2004). Privatizing Urban Water Services in Developing Countries. Water Manage. J. 157(3): 123-130.
Segal GF (2001). Navigating the Politics of Water Privatization. The Battles of New Orleans, Atlanta and Stockton. Reason Public Policy Institute, USA p. 112.
Shirley MM (2002). Thirsting for Efficiency. Washington, D.C. The World Bank.
Shiva V (2002). Water Wars: Privatization, Pollution, and Profit. South End Press.
Swyngedouw E (2004). Social Power and The Urbanization of Water Flows of Power. Oxford University Press.
UN Habitat (2005). Situation Analysis of Informal Settlements in Kisumu: Cities Without Slums. Sub-regional Programme for Eastern and Southern Africa. UN Habitat, Nairobi.
UNDP (2006). Human Development Report 2006. Beyond Scarcity: Power, Poverty, and the Global Water Crisis. London : Palgrave Macmillan for United Nations Development Programme.
World Bank (2003). Water Resources Strategy. World Bank, Washington, D.C.
World Bank (2005) Water for the Urban Poor: Water Markets, Household Demand, and Service Preferences in Kenya. Water Supply and Sanitation Sector Board p. 5
WUP (2002). Utility Management and Reduction of Unaccounted for Water. Water Utility Partnership Project p. 3.