

# **Serving all urban consumers**

Book 4: Sample strategic marketing plan  
for Mombasa and Coastal Region

**A marketing approach to water services  
in low- and middle-income countries**

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## **Glossary**

<b>AIC</b>	Average Incremental Cost
<b>CVM</b>	Contingent Valuation Method
<b>DFID</b>	Department for International Development, UK
<b>KSh</b>	Kenyan Shilling (unit of currency)
<b>NWCPC</b>	National Water Conservation and Pipeline Corporation, Kenya
<b>O&amp;M</b>	Operation and Maintenance
<b>PEST</b>	Political, Environmental, Social, Technological
<b>SMP</b>	Strategic Marketing Plan
<b>SWOT</b>	Strengths, Weaknesses, Opportunities, Threats
<b>UFW</b>	Unaccounted For Water
<b>WEDC</b>	Water, Engineering and Development Centre, UK
<b>WTP</b>	Willingness To Pay

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# 1. Introduction

This sample strategic marketing plan (SMP) for Mombasa in Kenya has been completed as part of urban water sector marketing research that was lead by Water and Engineering Development Centre (WEDC) and IWE, Cranfield University and funded by DFID (UK). The purpose of the Mombasa urban water sector research was to test the strategic marketing methodology outlined in Wilson and Gilligan, 1997.

This publication serves as an example of strategic marketing approaches for the urban water sector that are set out in the following three guidance books that are published by WEDC:

Serving *All* Urban Consumers

A marketing approach to water services in low and middle-income countries  
Book 1: Guidance for government's enabling role

Serving *All* Urban Consumers

A marketing approach to water services in low and middle-income countries  
Book 2: Guidance notes for managers

Serving *All* Urban Consumers

A marketing approach to water services in low and middle-income countries  
Book 3: PREPP – utility consultation with the urban poor

These publications can help assist in the development of plans to a) improve water services and increase service provision to all consumer groups and b) to ensure utilities are financially sustainable. The books are available on the WEDC web-site ([www.lboro.ac.uk/wedc/projects/psd/](http://www.lboro.ac.uk/wedc/projects/psd/)).

## **2. Executive Summary**

### **2.1 Background**

As part of the DFID funded research project on *Pricing and service differentiation of utility water and sanitation for the poor* the principal researcher has undertaken fieldwork research in Mombasa, Kenya. The purpose of the field work research was to prepare a detailed Sample Strategic Marketing Plan (SMP) that demonstrates a methodology for application of pricing and service differentiation in the management of urban water services.

The Mombasa SMP provides an institutional analysis of the water utility mandated to manage water services in Mombasa, the National Water Conservation and Pipeline Corporation (NWPC). This analysis includes an assessment of the utility's existing water supply infrastructure. The SMP presents results of a comprehensive customer survey and willingness to pay study carried out in Mombasa during August 2000. The results of the customer survey include an assessment of existing customer services and customers' perceptions of the water utility. The results of the willingness to pay study show the amount of money that customers are willing to pay for improved water services provided through different service options offered to respective market segments in Mombasa.

The SMP uses the results of the customer survey and willingness to pay study, as well as the principal researcher's knowledge of the city, to propose water service options that NWPC can provide to different market segments. The SMP outlines necessary improvements in water supply infrastructure and management that NWPC should undertake in order to improve water services and achieve financial sustainability. Projections of costs for improvements and the revenue that NWPC can obtain from improvements in water services are provided. The projections show that NWPC can improve water services to customers and achieve financial sustainability by using the pricing and service differentiation methodology.

### **2.2 Objectives of the Strategic Marketing Plan (SMP)**

The SMP is a framework for sustainable improvement of water services, mainstreaming poverty reduction in the utility's business. The objective of the SMP is to enable NWPC to improve its service provision to customers (including the low-income customers who are currently not served), while meeting its financial objectives. Preparation of the SMP aims to develop and demonstrate a methodology that water utilities could use to structure their service delivery to customers while meeting their objectives. The key marketing objectives of the SMP are to:

- Capture more of the water market in Mombasa

- Achieve equity in service provision by serving the poor, most of who are currently not served and rely on alternative sources
- Improve customer service and
- Improve NWCP's financial position

The SMP shows how NWCP can improve services to customers and potential customers in Mombasa and the coastal area in a financially sustainable manner.

### **2.3 Existing service levels and NWCP's challenge**

A larger number of customers in Mombasa and the coastal area are not satisfied with the services they receive from NWCP. Many potential customers are not adequately served by NWCP and have resorted to alternative sources. For some customers, service delivery is often characterised by water shortages, intermittent supply at low pressure or no water at all. This situation has resulted to a thriving water market in Mombasa. NWCP clearly faces a big challenge in meeting the water requirements of all existing and potential customers in Mombasa and the coastal area in a financially sustainable manner. A summary of existing service levels in each market segment is presented in Table 1.

**Table 1. Summary of existing service levels per market segment where people live**

<b>Selected parameter</b>	<b>Bungalows &amp; maisonettes</b>	<b>Flats</b>	<b>1, 2 or 3 roomed dwellings &amp; Swahili Houses</b>	<b>Informal settlements (Slums)</b>
Electricity supply in dwelling	100%	97%	60%	6%
Do not receive water directly from NWPCPC	35%	17%	58%	96%
Receive continuous supply of water from NWPCPC	30%	31%	13%	2%
Receive water once or twice a day from NWPCPC	27%	40%	24%	1%
Individual House connections	94%	78%	23%	2%
Shared connections	Nil	12%	28%	4%
No piped water connection	6%	10%	49%	94%
Pays NWPCPC for water directly	70%	74%	36%	1%
Obtain free water from b/hole or well	5%	3%	39%	41%
Obtains water from handcart vendors	18%	45%	57%	46%
Obtain water from kiosks	Nil	22%	56%	79%
Proportion with own b/holes/wells	39%	Nil	2%	Nil
Monthly water bill	KSh1400	KSh500	KSh450	(KSh425 to 741)
People in household	6.81	5.52	6.31	5.44
Main water source	Indv. Hse connections (59%) and own B/holes or wells (25%)	Indv. Hse connections (71%) and shared connections (12%)	Water kiosks (44%) and shared connections (23%)	Water kiosks (70%) and B/holes or wells (18%)

In addition to an extensive customer survey undertaken in Mombasa City, focus group discussions were held in three informal settlements in the city, in order to triangulate information obtained from the survey. Findings from the customer survey in informal settlements were confirmed through focus group discussions using the PREPP methodology (Coates et al, 2004). The focus groups held in each of the three informal settlements identified and discussed existing water sources. The groups ranked existing water sources in order of most preferred (1<sup>st</sup> ranking) to least preferred. Table 2 shows the range and ranking of current water sources in the three informal settlements.

**Table 2. Existing water sources and coping strategies (group ranking) in three informal settlements**

Service option	Kisumu Ndogo (men)	Kisumu Ndogo (women)	Muoroto Paradise (men)	Muoroto paradise (women)	VOK (men)	VOK (women)	Overall ranking of existing sources
Ordinary water kiosk	1	1	1	1	1	1	1
Kiosk with no structure	2	3	N/A	N/A	N/A	2	2
Water collected from shallow well (salty water)	N/A	N/A	2	2	N/A	N/A	2
Roof catchment	N/A	N/A	3	N/A	N/A	N/A	N/A
Borehole or well with pump (salty water)	3	5	N/A	N/A	2	3	4
Hand cart vendor (from kiosk or from wells and boreholes)	4	2	N/A	N/A	3	4	4
Water tanker (free water supplied during severe shortages)	N/A	4	N/A	N/A	N/A	N/A	N/A
Traditional source (pools of rain water, often muddy)	N/A	6	N/A	N/A	N/A	N/A	N/A

Table 2 shows that there is a wide range of water sources in informal settlements with kiosks being the most preferred water source. All groups considered kiosks to be providing the best quality water. Most of the alternative water sources (apart from some handcart vendors) provide water of low quality that is only suitable for washing. Most households buy drinking water from kiosks or obtain from handcart vendors but use other sources for non-drinking water.

## 2.4 Willingness to pay for improved water services

The customer survey and willingness to pay study carried out in Mombasa revealed that customers and potential customers are willing to pay substantial amounts for improved water services. The results of the willingness to pay study for each service option and respective market segment are presented in Tables 3 – 5.

**Table 3. WTP for options offered to people in Bungalows, maisonettes and flats**

Service level (option)	Brief Description of service option	Market Segment	Percentage of respondents within market segment who bid for the stated service option	Weighted Mean WTP (KSh)	Amount which 2/3 of respondents who bid are WTP (KSh)
Service level 1	Continuous supply at House connection	People living in Bungalows, Maisonettes and Flats	99%	1568	1217
Service level 2	12-Hr supply at House connection	Ditto	97%	858	850
Service level 3	4-Hr supply at House connection, rationing	Ditto	32%	341	250



**Table 4. WTP for options offered to people living in 1,2 or 3 roomed dwellings and Swahili Houses**

<b>Service level (option)</b>	<b>Brief Description of service option</b>	<b>Market Segment</b>	<b>Percentage of respondents within market segment who bid for the stated service option</b>	<b>Weighted Mean WTP (KSh)</b>	<b>Amount which 2/3 of respondents who bid are WTP (KSh)</b>
Service level 4	Continuous supply at yard connection	People in 1,2 or 3 Roomed dwellings & Swahili Houses	100%	1124	834
Service level 5	Continuous supply with storage tank at shared yard connection	Ditto	100%	1023	800
Service level 6	12-Hr supply at shared yard connection, rationing	Ditto	62%	537	447
Service level 7	4-Hr supply at shared yard connection	Ditto	54%	395	336

**Table 5. WTP for options offered to people living in informal settlements**

Service level (option)	Brief Description of service option	Market Segment	Percentage of respondents within market segment who bid for the stated service option	Weighted Mean WTP (KSh)	Amount which 2/3 of respondents who bid are WTP (KSh)
Service level 8	Continuous supply with storage tank at shared yard connection (about 10 dwellings)	People living in dwellings in informal settlements (slums)	98%	1103	592
Service level 9	12-Hour supply at shared yard connection (about 10 dwellings), rationing	Ditto	95%	610	500
Service level 10	Ditto but 4-Hour supply	Ditto	63%	302	236
Service level 11	Privately managed kiosk with shelter and tank	Ditto	54%	3/50 per 20-litre container	3/25 per 20-litre container
Service level 12	Community managed kiosk with shelter & tank	Ditto	48%	3/= per 20-litre container	2/65 per 20-litre container
Service level 13	Privately managed kiosk, no shelter or tank	Ditto	10%	1/50 per 20-litre container	1/60 per 20-litre container

#### **2.4.1 Estimate of willingness to pay (WTP) using focus group discussions**

In addition to the willingness to pay study undertaken using the contingent valuation method, focus group discussions using the PREPP approach were held in three informal settlements in order to obtain an indication of their preferences and willingness to pay for priced service options.

Tables 6 and 7 show respectively the results of group and individual ranking of service options by each of three informal settlements and by gender. The tables show that customers living in informal settlements have a higher preference for community and privately managed improved water kiosks than for shared yard connections.

**Table 6. Group ranking of priced service options by informal settlement and by gender**

<b>Service option</b>	<b>Kisumu Ndogo (men)</b>	<b>Kisumu Ndogo (women)</b>	<b>Muoroto Paradise (men)</b>	<b>Muoroto paradise (women)</b>	<b>VOK (men)</b>	<b>VOK (women)</b>	<b>Overall ranking of option</b>
Service Level 8 Shared yard connection with storage 18-24 hrs. KSh1200/= per month	4	5	6	6	5	5	6
Service level 9 Shared yard connection with no storage, 12 hrs supply KSh800/= per month	5	4	5	4	6	6	5
Service level 10 Shared yard connection with no storage, 4 hrs supply KSh500/= per month	6	2	3	5	4	4	4
Service level 11 Privately managed water kiosk with storage KSh3/= per 20 litre container	2	6	1	3	1	3	2
Service level 12 Community managed water kiosk with storage KSh2/= per 20litre container	1	1	2	1	2	1	1
Service level 13 Privately managed ordinary water kiosk KSh2/50 per 20litre container	3	3	4	2	3	2	3

**Table 7. Individual ranking of priced service options by informal settlement and by gender**

Service option	Kisumu Ndogo (men)	Kisumu Ndogo (women)	Muoroto Paradise (men)	Muoroto paradise (women)	VOK (men)	VOK (women)	Overall ranking of option
Service Level 8 Shared yard connection with storage 18-24 hrs. KSh1200/= per month	4	5	4	6	3	5	5
Service level 9 Shared yard connection with no storage, 12 hrs supply KSh800/= per month	5	4	5	5	6	6	6
Service level 10 Shared yard connection with no storage, 4 hrs supply KSh500/= per month	5	2	6	3	4	4	4
Service level 11 Privately managed water kiosk with storage KSh3/= per 20 litre container	2	6	1	4	2	3	3
Service level 12 Community managed water kiosk with storage KSh2/= per 20litre container	1	1	3	1	1	1	1
Service level 13 Privately managed ordinary water kiosk KSh2/50 per 20litre container	3	3	2	2	5	2	2

## 2.5 Financial aspects of the strategic marketing plan

### 2.5.1 Current NWPC water services

Based on records, figures, and estimates for 1999/2000, there are three categories of customers, these being residential, kiosks (or public) and industrial (or commercial). Consumption for each of these categories was estimated as follows:

Residential (individual connections or yard =14,092,543 m<sup>3</sup> (63%)

connections)	
Kiosks or public	=1,565,838 m <sup>3</sup> (7%)
Industrial	=6,710,735 m <sup>3</sup> (30%)

(Although metering was 100%, only about 56% of billed consumption was based on actual meter reading. This is because meters were either not functional or not read. Some institutional customers such as hotels are included in the category of residential customers.)

Current volume of water sold per annum	=22,369,116m <sup>3</sup> /year
Current annual billing (potential revenue)	=KSh679 862 316/year
Current average annual revenue (actual revenue collected)	=KSh462 841 404
Current average tariff (based on actual revenue collected)	=KSh21/m <sup>3</sup> (aboutUS\$0.30/m <sup>3</sup> )

(Before implementation of the November 1999 tariff)

Current bill collection efficiency	=68%
Current unaccounted for water (UFW)	=35%

### **2.5.2 Estimates for adequate and sustainable water services**

Estimated quantity to be produced, sold and paid for per annum	=43,800,000m <sup>3</sup>
Estimated annual operations & maintenance expenditure	=KSh1, 956,181,000
Required average tariff to cover O & M only	=KSh45/m <sup>3</sup>
Required average tariff to cover all costs (based on AIC)	=KSh88/m <sup>3</sup>
Required average annual revenue	=KSh3, 854,400,000

### **2.5.3 Proposed scenario and projected income**

It is proposed to implement the 2<sup>nd</sup> Mzima project consisting of new bulk supply development and improvements to the distribution system. It is assumed that the capital requirement for implementation of bulk supply and improvements to the distribution system is US\$285 million. Another US\$10 million may be required for rehabilitation of the system in the 10<sup>th</sup> year after commissioning. It is assumed that funding for the full costs of improving the water supply system will be secured at 8% interest repayable in 25 years from commissioning. It is further assumed that loan repayments will be met entirely from water sales in Mombasa and the coastal region.

It is assumed that management improvements to ensure commercial management will be undertaken and proposed service options promoted in respective market segments. A modest level of management efficiency is

assumed at 20% unaccounted for water (UFW) and 85% bill collection efficiency. With these assumptions and projections, the proposed scenario and income is summarised in Table 8.

**Table 8. Possible service options and projected revenue**

<b>Proposed water supply options</b>	<b>Expected volume of water sold and paid for (m<sup>3</sup>/yr)</b>	<b>Proposed water tariffs based on WTP survey (KSh/m<sup>3</sup>)</b>	<b>Projected income from each option (KSh)</b>
12-24 Hour supply at individual House connection	14 691 250	60	881 475 000
12-24 Hour supply at shared House (flat) connection	766 500	55	42 157 500
12-24 Hour supply at yard connection with utility storage tank	2 146 200	50	107 310 000
12-24 Hour supply at yard connection (no utility tank)	2 146 200	45	96 579 000
12-24 Hour supply at water kiosks with storage and structure (privately or community managed)	1,124,200	25	28,105,000
12-24Hour supply to commercial, industrial and institutional customers	22 925 650	120	2 751 078 000
Total	43,800,000m <sup>3</sup>		KSh3 906 704 500

The table shows that with the assumed service options, the total projected revenue for the utility would be KSh3 906 704 500 per annum. The proposed average water tariff would be KSh89/20 (about US\$1.20) per m<sup>3</sup>.

Assuming that the total annual costs to cover both capital and recurrent expenditure remains at the estimated amount of KSh3, 854,400,000, then the utility can make a modest profit amounting to KSh52 304 500 (about US\$716 500) per annum.

This profit could be used to improve water services in other areas. The utility should therefore meet the requirements of customers and still be financially sustainable, if this programme were to be implemented.

### **3. Introduction – Mombasa SMP**

The National Water Conservation and Pipeline Corporation (NWPC) is mandated by the Kenya Government to supply water services to all customers in Mombasa, as well as in many other urban and rural areas in Kenya. Mombasa is Kenya's second largest city and is located at the eastern coast of the Indian Ocean. The location of Mombasa is shown in annexes 8.1 and 8.2. To aid management of water services in the region, NWPC has divided Mombasa and the coastal region into ten areas, four of which are in Mombasa City. These are Mombasa Island, West Mainland, South Mainland and North Mainland. The other areas are Voi, Mazaras, Kwale, Kilifi, Malindi and Baricho.

In this sample strategic marketing plan for water services in Mombasa and the coastal region, theoretical background of and justification for marketing water services is provided. The analysis of the existing situation (where are we now?) in Mombasa is provided. Suggestions and proposals to improve services to existing customers and to capture more of the water market (where do we want to be?) are presented. Suggestions on how to achieve the desired outcomes (how might we get there?) are presented. Expected benefits are summarised and possible risks identified for allocation as appropriate.

## **4. Marketing Water Services**

### **4.1 What is marketing?**

Marketing has been defined as *‘the management process responsible for identifying, anticipating and satisfying customer requirements profitably’* (Jones, 1989). The implications of this definition are that ongoing communication with existing and potential customers is required to check the effectiveness of efforts to identify, anticipate and satisfy customer requirements. While different water utilities have different financial objectives, all utilities need to generate sufficient funds for future investment.

Another way of looking at marketing is as a set of tools. One such tool is the marketing mix or the 7p’s of marketing (product, price, promotion, place, people, process and presence) which are aspects to be reviewed in order to respond adequately to demand. A utility with a marketing orientated philosophy would have its entire operations, its personnel and its technical systems, being geared to providing improved customer satisfaction and to contribute towards meeting its financial objectives. Market segmentation, service differentiation and appropriate pricing are key to achieving these objectives.

### **4.2 Why market water services?**

Marketing is about satisfying customers while meeting the financial objectives of the organisation that is providing the services. In the context of a water utility such as NWCPC, marketing is about satisfying customers in its area of operation while meeting the objectives of the water utility. The objectives of NWCPC are reflected in its mission statement, which states: “The Corporation is committed to providing a regular supply of high-quality water to its customers at an affordable price and at a reasonable profit to the corporation.”

In order to achieve its objectives, it is necessary for a water utility to prepare a business strategy. Business strategy may be viewed as a set of actions by means of which a market position relative to other competing enterprises is sought and maintained. “Strategy” is not synonymous with “long-term plan” but rather consists of an enterprise’s attempts to reach some preferred future state by adapting its competitive position as circumstances change (Wilson and Gilligan, 1997).



A casual observation of the water situation in Mombasa reveals that a thriving water market exists. Whereas NWCP has legal mandate to supply water to all customers in Mombasa, other suppliers operate in the city as well. Presence of other suppliers is an indication that NWCP faces competition, though this may not be felt due to among others, infrastructure constraints. Evidence of the existence of a water market and the competition faced by NWCP is seen in form of:

- Illegal connections to the water utility's distribution network.
- Private water vendors (hand carts and water tankers)
- Individual and/or private water sources such as wells, bore-holes and roof catchment.

One of the most significant findings of the customer survey carried out in Mombasa is that many customers have multiple water sources. This means that although NWCP has legal mandate to supply water to all the people living in Mombasa, in practice it faces considerable competition from other sources. The perceived monopoly status of NWCP as a water undertaker in Mombasa is not real, perhaps a reflection of the level of service provided to customers by NWCP. It is therefore necessary for NWCP to market its services with a view to capture more of the existing water market and benefit fully from its legal monopoly status. This could lead to increase of water sales with potential for increase in revenue and thus enable NWCP to attain financial sustainability.

Application of marketing techniques could enable NWCP to survive and thrive in the water market. A Strategic Marketing Plan (SMP) enables an organisation chart a course that could improve its effectiveness. An effective water utility is one that achieves its mission. NWCP's mission is *"to provide a regular supply of high-quality water to its customers"* and make *"a reasonable profit"*. NWCP needs a strategic marketing plan to enable it to achieve this mission.

Marketing of different water supply options has scope in infrastructure constrained cities such as Mombasa. In areas where the water utility is unable to provide a 24-hour water service, there is scope to increase quality of service by providing substantive and some peripheral service attributes using appropriate technical and management options. This can result in an increase in service quality and reliability, and thus enhance customers' perception of the value of the water service. This has the potential to increase customers' willingness to pay for the services thus maximising utility income and improving prospects of financial sustainability.

A service cannot be all things to all people. Groups or segments of customers should be singled out for a particular service, their needs determined, and a service concept developed that provides a competitive advantage for the server in the eyes of those to be served. This is the basis of market segmentation, a principle that could be applied by NWCP.

Customers' needs and conditions differ from one neighbourhood to the next. It may not be realistic for the water utility to provide a uniform service to customers whose needs, wants and willingness to pay are so different. The water utility can offer a *range* of service levels at different prices, hence service differentiation and pricing with due regard to customers' ability and willingness to pay.

### 4.3 How to market water services

Progressive customer orientated water utilities appreciate the crucial importance of the customer as the reason why the utility exists. The key to marketing of water services is to know the customer. It is important to build exchange relationships with current and potential customers. A useful approach to achieve this is to use the concept of "Customer Value Chain" (Sage, 2000).

#### 4.3.1 The Customer Value Chain

The concept of the "Customer Value Chain" is to *know, target, sell and service*. This concept is increasingly used in the commercial sector. In the context of the water sector, the customer value chain involves customer knowledge through market segmentation, service differentiation, service promotion and service provision. Details of this concept are as follows:

**Know** and understand the different customer and potential customer groups, including their attitudes, practices, perceptions, preferences and their willingness to pay and sustain payment for improved services. Since water is perceived both as a social and an economic good, effort is needed to understand people's perceptions. Methods available for getting to know perceptions of water users include questionnaire surveys, focus group discussions, customer consultative committees and local observation.

**Target** specific customer groups or market segments (e.g. commercial customers and domestic customers in high, medium and low-income areas), with appropriate service options, such as house connections, yard taps and water kiosks, with or without storage tanks, at appropriate price levels. Other options that can be offered are payment options (e.g. by post, at a bank, or at a local office) and shared management options.

**Sell** options using suitable promotion techniques. This will often require careful planning and implementation particularly when dealing with groups who use alternative water supplies or if they have unauthorised pipe connections and do not currently pay.

**Services** provided to a high quality standard, delivered through a balance of people, processes and technology by knowledgeable staff. To provide such a standard of service requires utilities to adopt a programme of continual organisational improvement centred on 'the customer'. In addition, effective collaboration between different departments within a utility (such as customer relations, billing, operation and maintenance, financial management etc.) can enable the resolution of typical customer problems.

The key to customer knowledge is market segmentation.

#### **4.3.2 Market segmentation**

Segmentation is the process of identifying groups of customers with enough characteristics in common to make possible the design and presentation of a product or service each group needs (Heskett, 1986). By identifying a segment's special needs, the service provider can then design services to meet them better and in a financially sustainable manner. A market may be segmented according to demographic dimensions such as age, income, education level, family size and location. Each may have different relevance to a particular business.

In many urban areas of developing countries, the type of dwelling that people live in are generally a reflection of their socio-economic status. The people who live in slums and other informal settlements are generally the very poor, although there are also poor people living in other market segments such as the 1, 2 or 3 roomed dwellings and Swahili houses. People living in well-planned residential estates with infrastructure services tend to be the more affluent in the population. Where possible, the type of dwelling is therefore a convenient method that a water utility could use to segment the water market.

Market segmentation can be carried out on the basis of the type of dwellings households live in. For instance, depending on the city under consideration, dwellings can be categorised in four segments as hereunder:

1. Bungalows and maisonettes
2. Flats
3. 1, 2 or 3 roomed dwellings (Swahili type of dwelling).
4. Dwellings located in informal settlements (slums) made of informal building materials such as re-used timber, iron sheets, packaging boards and paper.

This method of market segmentation is relatively easy to implement in the field as all dwellings could easily fit into one of these specific market segments. It is also known that this categorisation readily fits into income groups that make up specific market segments. Another advantage of this categorisation is that viable technical options for urban water supply distribution could be marketed and provided to suit this type of segmentation. Two other market segments were identified as follows:

Mixed development, consisting of a variety of different types of dwellings  
Commercial, industrial and institutional establishments

Any dwelling located in an area with mixed development could be regarded as belonging to one of the four market segments identified above. It was assumed that for purposes of this research, commercial, industrial and institutional establishments would require (and be willing to pay) the highest possible level of service that domestic users of water would demand.

The principle of market segmentation could be applied in the water sector. Though the *product* delivered to all segments in the water market would be similar (good quality potable water that meets the necessary standards), the method of delivery, and hence the *service* would be different to suit the segment's special needs and wants.

A common principle of strategic marketing that can be followed by water utilities is (Wilson & Gilligan, 1997):

- Where are we now?
- Where do we want to be?
- How might we get there?

## **5. Where is NWCP now?**

This section looks at the 1999/2000 situation in NWCP with regard to the institutional set up, management, finance and water services to customers in Mombasa and the coastal area.

### **5.1 Institutional arrangements and management**

The National Water Conservation and Pipeline Corporation (NWCP) is a state owned enterprise mandated to provide water services to all customers in Mombasa and the coastal area among others. A board of directors appointed by the government provides policy direction to the corporation. Board members are drawn from the private sector with representatives from the Government. The board has a non-executive chairman and a Managing Director. The Managing Director is the chief executive who heads the management team and reports to the board of directors.

The senior management team at the corporation's head office in Nairobi consists of the Managing Director and five Chief Managers responsible for each of the corporation's five departments (finance, human resources, corporate services, development, and operations). The corporation is divided into five regions; each headed by a Regional Manager. Coast is the largest region and has ten areas, each headed by an Area Manager. The ten Area Managers report to the Chief Regional Manager at the regional headquarters in Mombasa. Four of the ten areas in coast region are in Mombasa City. These are Mombasa West Mainland, South Mainland, North Mainland and Mombasa Island.

### **5.2 Cost recovery and financial performance**

#### **5.2.1 Water production**

Mombasa is among the areas that comprise Coast region of NWCP and is the regional headquarters. The area receives water from a combination of sources that supply the entire Coast Region. The current (1999/2000) total production from all sources is about 34,310,000m<sup>3</sup>/year. Production capacities of various sources of water in Mombasa and the coastal area are presented in Annex 8.1.

### 5.2.2 Water consumption

Water supply in Mombasa and the coastal region is fully metered. Despite 100% metering, only about 56% of billed consumption is based on actual meter reading. This is because meters are either not functional or not read. Consumption data for different categories of customers was therefore estimated based on component of consumption that is billed according to actual meter readings. Three categories of customers were identified with estimated consumption as follows:

Residential (individual connections or yard connections)	=14,092,543 m <sup>3</sup> (63%)
Kiosks or public	=1,565,838 (7%)
Industrial	=6,710,735 (30%)
Total water consumption	=22,369,116 m <sup>3</sup>

(Some institutional customers such as hotels are included in the category of residential customers.)

The average per capita consumption was estimated at about 29litres per capita per day, assuming that 70% of the water sold is used for domestic consumption by a population of about 1,500,000 in Mombasa and coastal area.

### 5.2.3 Billing and revenue collection

The existing water tariff in Mombasa is applicable to all urban water projects managed by NWPC. The tariff is low and does not meet the full costs of water provision. NWPC's efforts to increase water tariffs resulted to introduction of new tariff that became effective on 1<sup>st</sup> November 1999. Though an improvement over the previous tariff, the new tariff does not cover full costs. A summary of the new tariff is presented in Annex 8.2.

The coastal region produces about 34,310,000 m<sup>3</sup> of water per year. The average volume of water billed by the utility was estimated at about 22,369,116m<sup>3</sup> per year. The unaccounted for water (UFW) is therefore about 35%. Prior to implementation of the new (November 1999) tariffs, the average value of water sold was KSh679 862 316 per year. Based on billing, the current average tariff is KSh30.40 (about US\$0.40) per m<sup>3</sup>

The average revenue actually collected was KSh462 841 404 per annum (based on actual revenue collection for three consecutive months prior to changes in tariff). The bill collection efficiency is therefore 68%. The average revenue collected per unit volume of water sold is KSh20.70 (US\$0.30)/m<sup>3</sup>. This is effectively the current average tariff as it takes into account operating management efficiency.

Based on available records, detailed calculations for performance indicators such as revenue collection are presented in Annex 8.3.

Outstanding arrears (cumulative since 1989) (includes disputed bills)	795,404,683
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The average revenue collected per unit volume of water sold is KSh20.70 (US\$0.30)/m<sup>3</sup>. This is effectively the average tariff as it takes into account operating management efficiency. Other estimates were as follows:

Current volume of water sold per annum	=22,369,116m <sup>3</sup> /year
Current annual billing (potential revenue)	=KSh679 862 316/year
Current average annual revenue (actual revenue collected)	=KSh462 841 404

(Before implementation of the November 1999 tariff)

Current average tariff (based on actual revenue collected)	=KSh21/m <sup>3</sup>
Current bill collection efficiency	=68%
Current unaccounted for water (UFW)	=35%
Average operating ratio	=42%

WATER CONNECTIONS (for Mombasa and coast region)

Number of connections	59,330
Number of working meters	47,449 (80%)
Number of non-working meters	11,881 (20%)
Total number of staff in Coast Region	596 (460 permanent and 136 temporary employees)
Number of employees per 1000 connections	10
Average number of people per connection	30
Average per capita consumption	29 litres per capita per day.

#### *Current water consumption per category*

There are presently three categories of customers with estimated consumption as follows:

Residential (individual connections or yard connections)	=14,092,543 m <sup>3</sup> (63%)
Kiosks or public	=1,565,838 m <sup>3</sup> (7%)
Industrial	=6,710,735 m <sup>3</sup> (30%)
Average total amount sold per year	=22,369,116 m <sup>3</sup> per year

The financial performance of NWCPD in recent years is indicated in the following financial ratios (see Table 9):

**Table 9. Summary of financial ratios (for NWCP Coast Region)**

Parameter	1997/98 (KSh)	1998/99 (KSh)	(**)1999 / 2000	Average (KSh)
Water Revenue Billing	405,742,032	677,695,470	732,179,338	Increasing
Water Revenue Collection	356,823,793	430,328,755	566,805,552	Increasing
Bill collection efficiency	88%	64%	77%	76%
(*)Recurrent Expenditure	153,928,925	201,197,356	197,775,828	43,124,916
Operating Ratio (Expenditure/Collections)	43%	47%	35%	42%

Source: Adapted from NWCP database and audited financial accounts, calculations by the author.

\*\*Data for 1999/2000 financial year includes both old and new tariffs. The billing program was reported to have had system problems leading to possibility of errors in billing. Billing data for 1999/2000 could therefore have had errors, and these would have been adjusted by NWCP following customer complaints.

\*Data for recurrent expenditure does not include loan repayments and depreciation.

Although the operating ratio appears to be favourable, recurrent expenditure shown in the above table does not include loan repayments and depreciation, it is not known whether NWCP Mombasa can balance its books and achieve financial sustainability at the 1999/2000 level of operation. Inadequate operation and maintenance expenditure might have contributed to the low operating ratio.

Although the average bill collection efficiency is decent at 76% and unaccounted for water at 35%, the level of outstanding revenue is high. High levels of outstanding revenue indicate that the revenue collection system requires improvement to make it more efficient. The likelihood of over billing should be investigated further, to ensure that the amount billed reflects the amount of water consumed by customers.

### 5.3 Existing service levels and customer services

Several research methods (interviews, observations, surveys and focus group discussions) were used to collect information on existing service levels and customer services. Triangulation of data was done to confirm existing situation.



### **5.3.1 Customer survey**

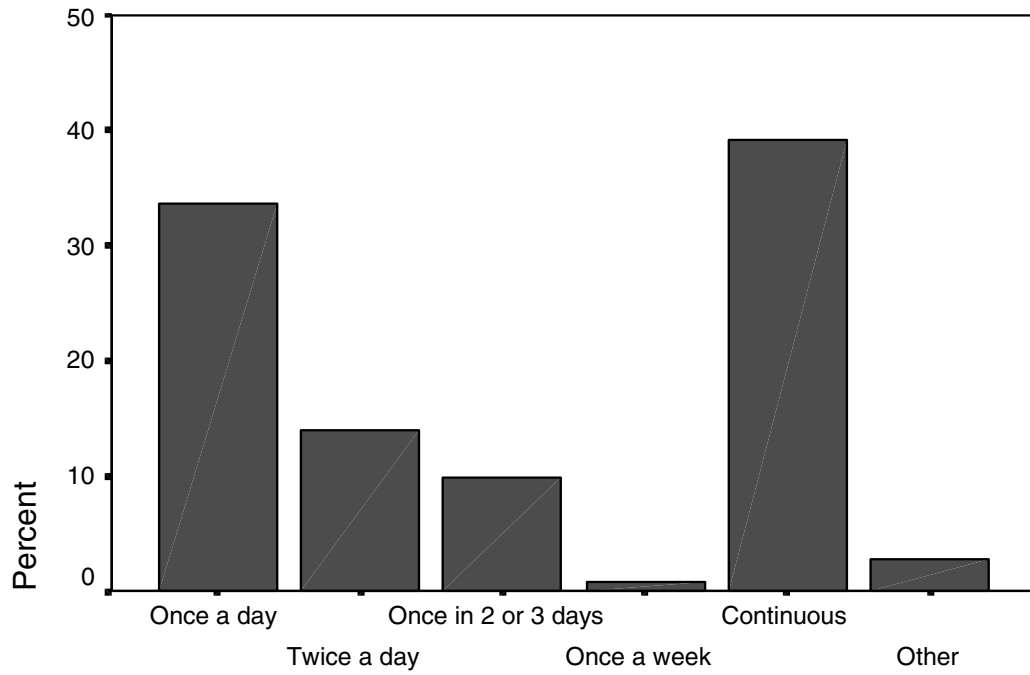
A customer survey was conducted to assess existing service levels and customer services in Mombasa. The comprehensive customer survey was preceded by a pilot customer survey. The customer questionnaire was piloted in Mombasa during August 1999. 70 respondents completed 70 questionnaires with the assistance of enumerators. The 70 respondents were identified at random in a part of Mombasa that is known to include all market segments. The results of the customer survey were analysed to form a picture of the current water situation in Mombasa. This information was used to prepare a comprehensive customer survey and willingness to pay questionnaire.

A comprehensive customer survey and willingness to pay study was undertaken in Mombasa during August 2000. Research assistants were trained and sampling done. A combination of sampling methods (including random, stratified random and quota sampling) were used to ensure that respondents interviewed represented all four geographical locations of Mombasa, different hydraulic systems and all four market segments. A representative sample of 312 respondents was interviewed using a comprehensive questionnaire administered by trained enumerators. The data was analysed using the statistical package for social scientists (SPSS version 10) software. Focus group discussions were also held in three informal settlements.

### **5.3.2 Levels of service provided by NWCP**

The customer survey revealed interesting results; for instance that only 46% of households in Mombasa receive water services **directly** from NWCP and even these do not receive continuous supply of water. The water supply frequencies are illustrated in Figure 1.

**Figure 1. Water Supply Frequency**



Water supply frequency

The water supply infrastructure in Mombasa and the coastal area is inadequate. Water is supplied to customers mainly on rationing basis. Some customers however receive a continuous supply of water mainly due to technical reasons. Figure 2 shows typical duration that water is supplied.

**Figure 2. Water Supply Duration**

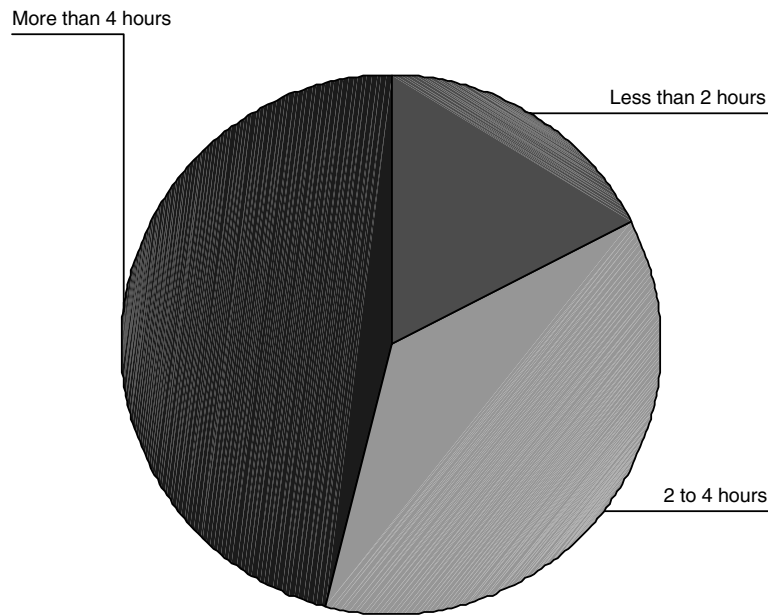


Figure 2 shows water supply duration for those who receive water from NWPC as:

- More than 4 hours (46%),
- 2 to 4 hours (36%) and
- Less than 2 hours (18%).

Service delivery is often characterised by water shortages, intermittent supply at low pressure or no water at all.

A considerable number of the customers interviewed are not satisfied with the services currently provided by NWPC. Many potential customers are not served by NWPC and have resorted to alternative sources. This situation has resulted to a thriving water market in Mombasa. Results of analysis of service levels and customer services for each market segment are presented below in Table 10.

**Table 10. Cross tabulation showing the main sources of water used by each market segments**

Main source of water	% Market Segment by type of dwelling				Total (%)
	Bungalows / Maisonettes	Flats	1, 2 or 3 roomed house or Swahili house	Dwelling in informal settlement or slum	
Individual connections	59.2	70.7	17.5	1.3	33.5
Shared connections		12.1	22.7	5.1	10.6
Water kiosks		6.9	44.3	69.6	32.9
Hand-cart vendors	7.9	6.9	2.1	2.5	4.5
Water tankers	5.3				1.3
Public B/holes and wells		3.4	7.2	3.8	3.9
Private B/holes and wells	2.6		4.1	17.7	6.5
Own B/holes and wells	25.0		2.1		6.8
TOTAL:	100.0	100.0	100.0	100.0	100.0

The table shows that the NWPC is the main direct source of water for 44% of households through individual and shared connections. 33% of households use water kiosks as their main source of water. The kiosks obtain water from a variety of sources including the NWPC's network. The levels of service as indicated by the water supply frequency for each market segment are shown in the cross tabulation below (see Table 11).

**Table 11. Cross-tabulation of water supply frequency with market segment**

Water supply frequency	% Market Segment by type of dwelling				Total (%)
	Bungalows / Maisonettes	Flats	1, 2 or 3 roomed house or Swahili house	Dwelling in informal settlement or slum	
Don't receive water directly from NWPC	34.6	17.2	57.7	96.2	54.2
Once a day	17.9	25.9	19.6		15.4
Twice a day	9.0	13.8	4.1	1.3	6.4
Once in 2 or 3 days	6.4	8.6	4.1		4.5
Once a week	1.3				0.3
Continuous	29.5	31.0	13.4	2.5	17.9
Other	1.3	3.4	1.0		1.3
TOTAL:	100.0	100.0	100.0	100.0	100.0

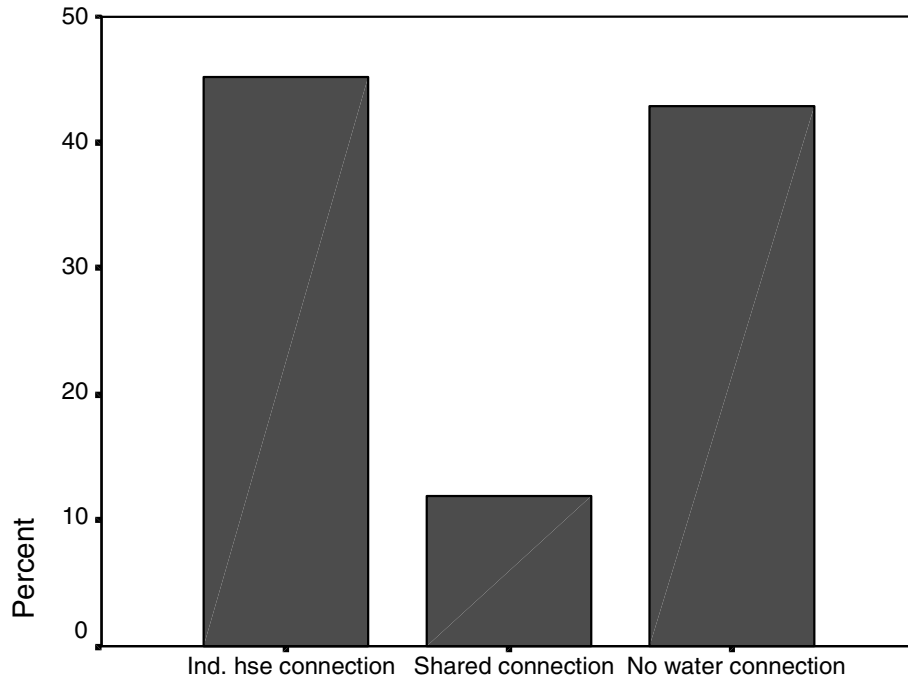
The table shows that over 54% of households do not receive water directly from NWPC. Water supply in some areas in Mombasa was reported to be intermittent with only 18% of households receiving water continuously. The segment that is least served by the utility consists of people living in slums and informal settlements. 96% of people in this segment do not receive any direct water service from NWPC. The table also shows that the water shortage in Mombasa affects all market segments in different proportions. It is evident from the survey that NWPC has a big challenge in meeting the water requirements of customers and potential customers in Mombasa.

### 5.3.3 Existing service options

As part of the customer survey, respondents in Mombasa were asked to state whether they had piped water connections, and if so the type of connection they had. 45% stated that they had individual water connections, 12% had shared connections and 43% did not have any piped water connection. Figure 3 illustrates the situation with regard to piped connections.

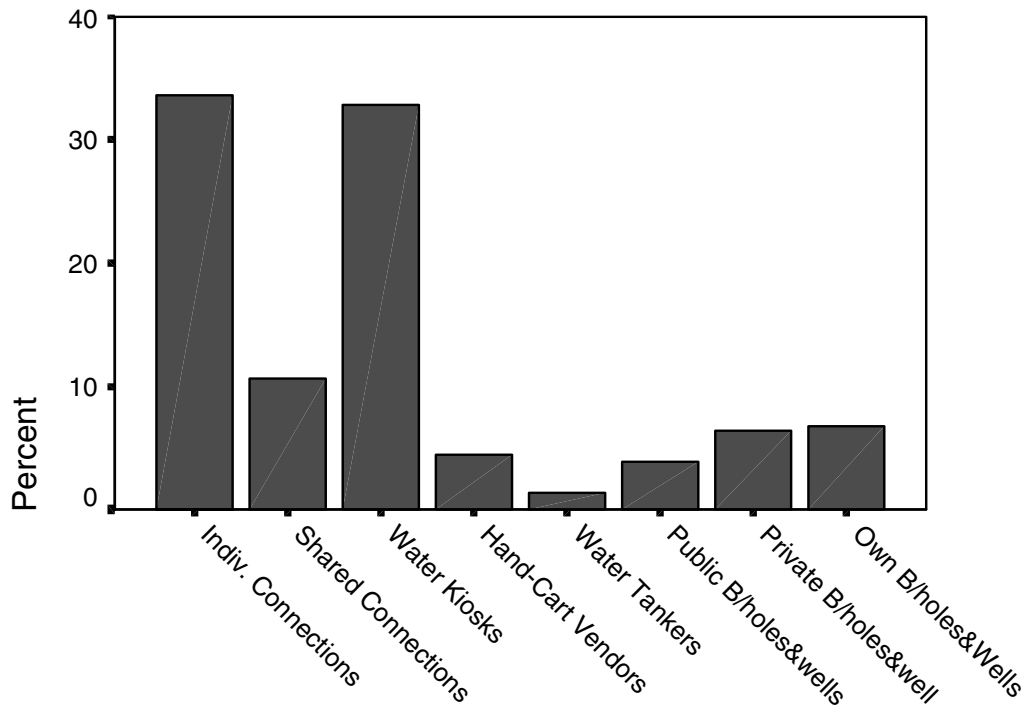
The findings would suggest that NWPC supply water directly to 57% (45% +12%) of the respondents. This is however not the case as there are water shortages in some part of Mombasa. Many customers who are connected to the distribution network indicated that they do not receive enough water while some do not receive water at all.

**Figure 3. Piped connections**



Respondents were also asked to state their main source of water. Only 44% (33.5% with individual and 10.6% with shared water connections) of the respondents stated that NWCP was their main direct provider of water services. 33% and 5% of respondents respectively cited kiosks and hand cart vendors as their main source of water. Some of the kiosks and vendors obtain water from the NWCP distribution network while others obtain from wells and boreholes. The various water sources are illustrated in Figure 4.

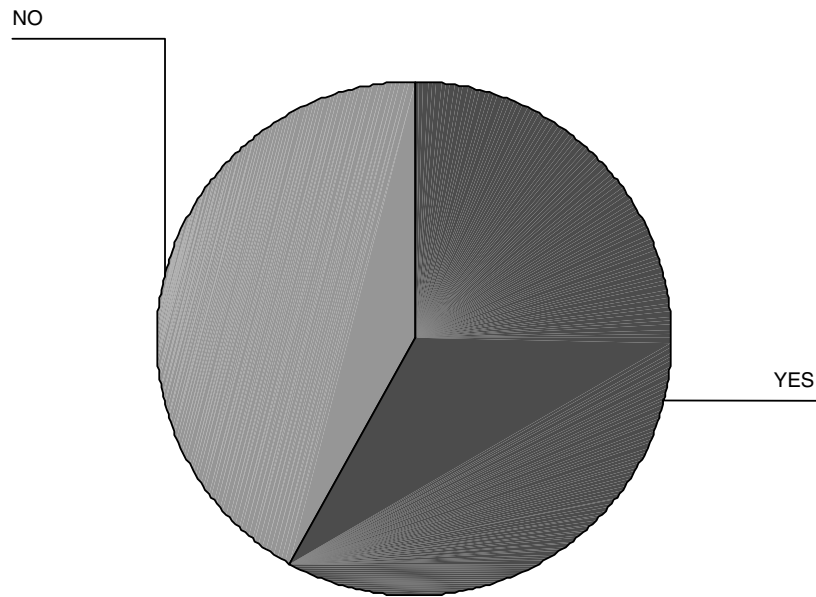
**Figure 4. Main Source of Water**



**Main source of water**

Customers who are connected to the distribution network and do not receive enough water from NWPC also use water from other sources. The survey revealed that 58% of customers who use NWPC water also use water from other sources. Figure 5 illustrates the situation.

**Figure 5. Do you use NWCP water together with other sources?**



This situation confirms that NWCP water is inadequate and supports the case for new investment in water supply infrastructure. This has implications on the tariff structure that NWCP should adopt.

Further analysis of water sources show that customers in different market segments rely on different sources for their main supply of water. Table 10 (p. 28) shows the main source of water for each market segment.

Most customers (97%) pay their water bills. 87% of respondents pay cash or cheque at the utility's offices, 4% pay through cheques by post, 6% pay the landlord and only 3% do not pay.

It is likely that those who stated that their water bills were not reasonable are the ones who had complaints on billing. At 46%, the level of billing complaints is considerably high. This is probably due to erroneous billing where customers are charged for water not consumed.

Although 69% of respondents stated that their water bills were reasonable, the current average monthly bills paid by customers are quite low compared to the indicative tariffs computed using the AIC method. Table 12 summarises the range of average monthly water bills.



**Table 12. Range of Monthly Water Bills**

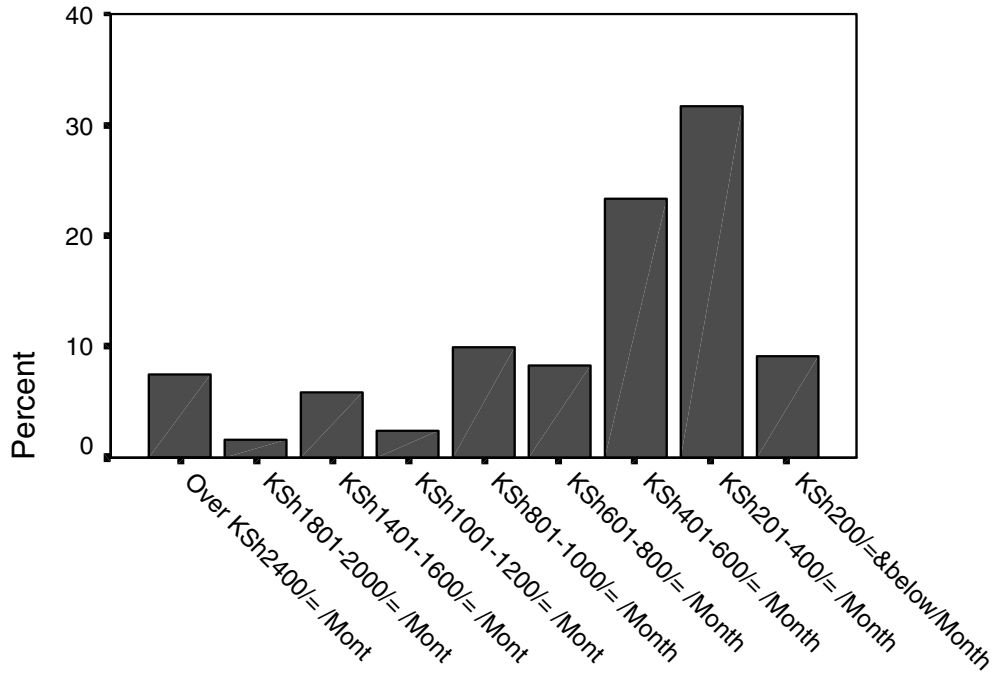
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Over KSh 2400/= /Month	9	2.9	7.5	7.5
KSh 1801-2000/= /Month	2	0.6	1.7	9.2
KSh 1401-1600/= /Month	7	2.2	5.8	15.0
KSh 1001-1200/= /Month	3	1.0	2.5	17.5
KSh 801-1000/= /Month	12	3.8	10.0	27.5
KSh 601-800/= /Month	10	3.2	8.3	35.8
KSh 401-600/= /Month	28	9.0	23.3	59.2
KSh 201-400/= /Month	38	12.2	31.7	90.8
KSh 200/= and below /Month	11	3.5	9.2	100.0
TOTAL	120	38.5	100.0	
Missing system	192	61.5		
TOTAL:	312	100.0		

This table shows that 60% of customers pay the utility KSh400/= or more per month for water services.

These figures show that there is scope for increasing the existing level of tariff, especially if it is accompanied by improved water services and billing. This finding is particularly important because NWCPD can use this fact to convince relevant authorities to allow higher cost-covering tariffs.

Figure 6 shows that most customers pay relatively small amount as water bills.

**Figure 6. Range of Monthly Water Bills**



**Range of Monthly water bills**

A cross tabulation of monthly water bills per market segment reveals that people living in bungalows and maisonettes pay significantly higher water bills to the utility than those living in other segments (see Table 13).

**Table 13. Monthly Water Bills in different Market Segments**

Range of Monthly Water Bills	% Market Segment by Type of Dwelling				Total
	Bungalows / Maisonettes	Flats	1, 2 and 3 Roomed Houses or Swahili House	Dwelling in Informal Settlement or Slum	
Over KSh 2400/= /Month	20.0				7.5
KSh 1801- 2000/= /Month	4.4				1.7
KSh 1401- 1600/= /Month	13.3		2.9		5.8
KSh 1001- 1200/= /Month		2.6	5.7		2.5
KSh 801- 1000/= /Month	20.0	2.6	5.7		10.0
KSh 601- 800/= /Month	11.1	10.5	2.9		8.3
KSh 401- 600/= /Month	15.6	36.8	17.1	50.0	23.3
KSh 201- 400/= /Month	11.1	47.4	40.0	50.0	31.7
KSh 200/= and below /Month	4.4		25.7		9.2
TOTAL	100.0	100.0	100.0	100.0	100.0

A summary of current service levels reported by each per market segment is presented below in Table 14.

**Table 14. Summary of reported service levels per market segment**

<b>Selected parameter</b>	<b>Bungalows &amp; maisonettes</b>	<b>Flats</b>	<b>1, 2 or 3 roomed dwellings &amp; Swahili Houses</b>	<b>Informal settlements (Slums)</b>
Electricity supply in dwelling	100%	97%	60%	6%
Do not receive water directly from NWPC	35%	17%	58%	96%
Receive continuous supply of water from NWPC	30%	31%	13%	2%
Receive water once or twice a day from NWPC	27%	40%	24%	1%
Individual House connections	94%	78%	23%	2%
Shared connections	Nil	12%	28%	4%
No piped water connection	6%	10%	49%	94%
Pays NWPC for water directly	70%	74%	36%	1%
Obtain free water from b/hole or well	5%	3%	39%	41%
Obtains water from handcart vendors	18%	45%	57%	46%
Obtain water from kiosks	Nil	22%	56%	79%
Proportion with own b/holes/wells	39%	Nil	2%	Nil
Monthly water bill	KSh1400	KSh500	KSh450	(KSh425 to 741)
People in household	6.81	5.52	6.31	5.44
Main water source	Indv. Hse connections (59%) and own B/holes or wells (25%)	Indv. Hse connections (71%) and shared connections (12%)	Water kiosks (44%) and shared connections (23%)	Water kiosks (70%) and B/holes or wells (18%)

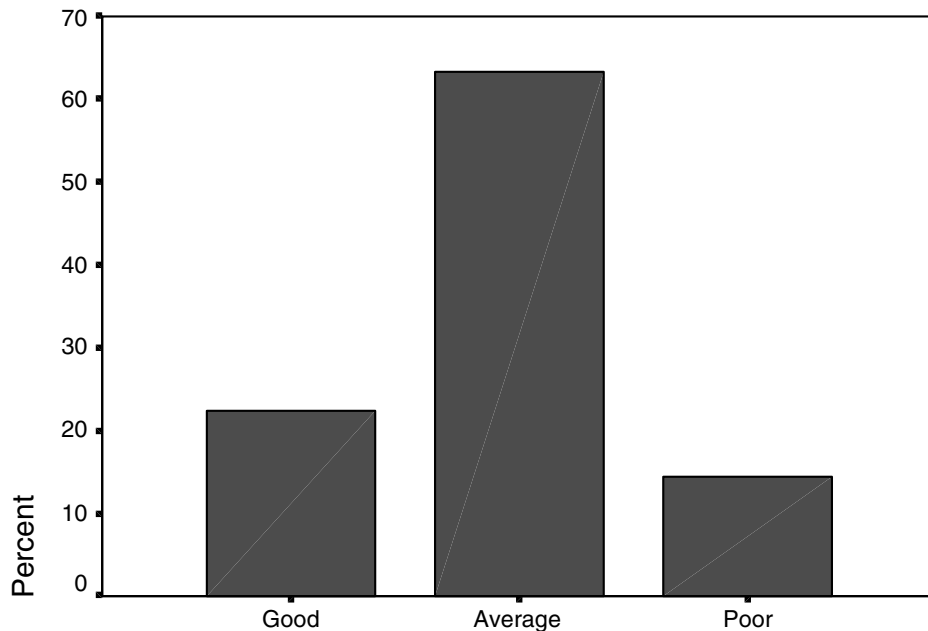
## 5.4 Customers' perceptions and coping strategies

### 5.4.1 Summary of customers' perceptions

This section looks at customers' perceptions in general, after which specific market segments are examined. Customers who do not receive services from NWPC did not give a view on customer service.

When asked to state the overall customer service provided by NWPC, only 22% of respondents stated that the utility provided "good" customer service. Figure 7 shows that most customers regard existing customer service as average or poor.

**Figure 7. Overall NWPC Customer Service**

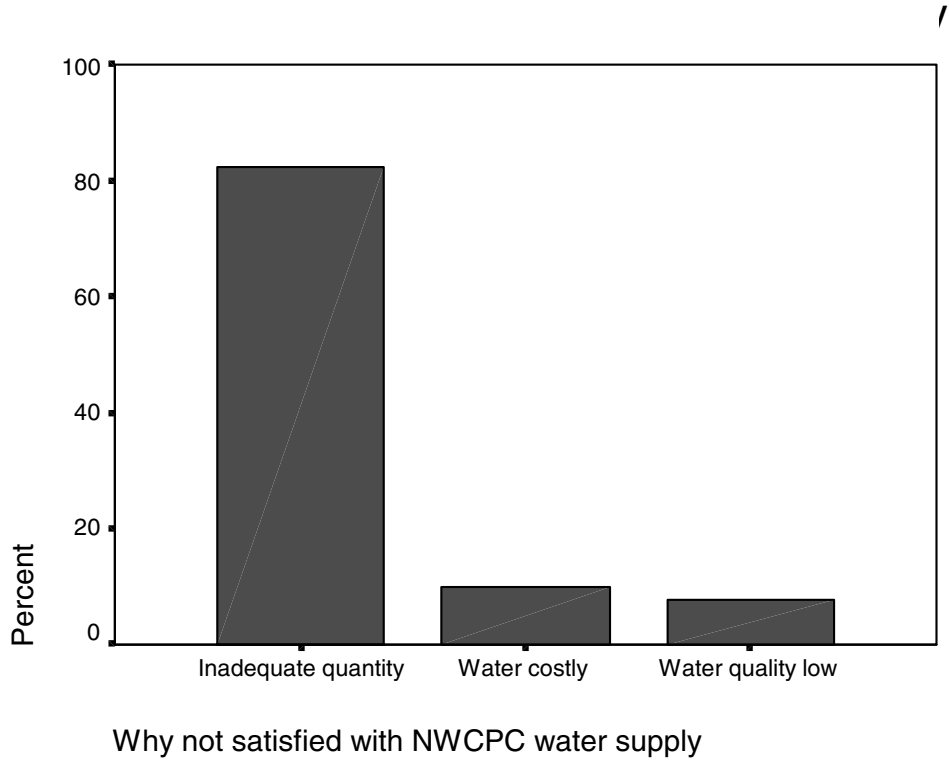


Overall NWPC Customer Service

Analysis of consumer survey data suggests that many customers interviewed are not satisfied with services provided by NWPC. The table above shows that there is room for NWPC to improve customer services.

Customers who stated that they were not satisfied with water services provided by NWPC were requested to give reasons for their dissatisfaction. Figure 8 represents their responses and shows that inadequate quantity of water is the main cause of dissatisfaction.

**Figure 8. Why not satisfied with NWPC Water Supply**



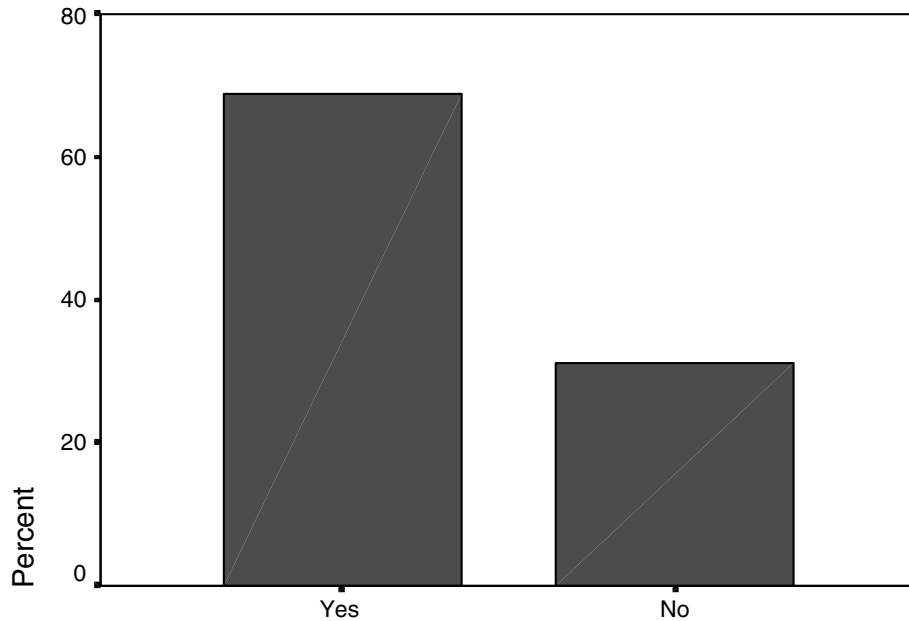
The fact that only 10% of those dissatisfied with NWPC water supply stated cost as the reason for their dissatisfaction suggests that paying for water is not a significant problem among customers. It is likely that customers not satisfied with NWPC on the basis of cost of water consider themselves as being currently over-billed as there are many billing complaints.

**5.4.2 Paying for water**

In order to understand customers’ perceptions on paying for water, respondents connected to the water distribution network and who receive water services from the utility were asked to state their views on billing. 86% of the respondents stated that they were metered, the meters were read regularly and billed on the basis of meter readings. 97% of respondents stated that they received water bills regularly. This finding means that NWPC is efficient in despatch of bills to customers. 46% of respondents had billing complaints. 85% stated that they understood their water bills. Although existing level of water services in Mombasa is low, existing tariffs are acceptable to customers. Figure 9 shows that 69% of respondents consider their water bills as reasonable.

It should be noted that water bills in Mombasa include a component for sewerage charges, which are based on a percentage of water consumption. There is no separate billing for sewerage.

**Figure 9. Is Water Bill Reasonable?**



Is water bill reasonable?

Inadequate quantity of water is the reason given by 82% of respondents who stated that they were not satisfied with the utility's water supply. NWCP's water is of acceptable quality. Tariffs are also acceptable since only 10% said that water was costly. This finding further confirms that NWCP water is inadequate and supports the case for new investment in water supply infrastructure.

The table below (Table 15) shows that 58% of customers living in bungalows and maisonettes are already paying an average of KSh800/= or more per month. This segment is therefore a potential source of revenue for the utility. The table below shows that a high proportion of customers who pay NWCP live in bungalows, maisonettes and flats. This also reflects on market segments that NWCP directly supply with water.

**Table 15. Percentage of consumers in each market segments paying for NWPC water**

Market Segment (by type of dwelling)		Pays NWPC for water		Total
		Yes	No	
Bungalows / Maisonettes	Count	53	23	76
	% within Market Segment	69.7	30.3	100.0
Flats	Count	43	15	58
	% within Market Segment	74.1	25.9	100.0
1,2 or 3 Roomed House or Swahili House	Count	35	62	97
	% within Market Segment	36.1	63.9	100.0
Dwelling in Informal Settlement or Slum	Count	1	78	79
	% within Market Segment	1.3	98.7	100.0
Total	Count	132	178	310
	% within Market Segment	42.6	57.4	100.0

#### **5.4.3 Customers living in bungalows or maisonettes**

NWPC is the main source of water to 59% of customers in this market segment who all have individual house connections. The main source of water for the rest of the customers is their own boreholes or wells (28%), handcart vendors (8%) and water tankers (5%).

55% of customers in this market segment use NWPC water in combination with water from other sources. This means that NWPC has substantial competition from other sources.

#### **5.4.4 Customers living in flats**

NWPC is the main source of water to 83% of customers in this market segment either through individual connections (71%) or shared connections (12%). The main source of water for the rest of the customers is water kiosks (7%) and handcart vendors (7%). Public boreholes and wells is the main source of water to 3% of customers in this market segment.

36% of customers in this market segment use NWPC water in combination with water from other sources. This means that NWPC has competition from other sources.



#### **5.4.5 Customers living in 1, 2, or 3 roomed dwellings and Swahili houses**

NWCPC is the main source of water to 40% of customers in this market segment either through individual connections (17%) or shared connections (23%). The main source of water for the rest of the customers is water kiosks (44%). Private operators manage almost all kiosks (98%). Public and private boreholes and wells is the main source of water to 13% of customers in this market segment while handcart vendors is the main source for 2% of the customers.

46% of customers in this market segment use NWCPC water in combination with water from other sources. This means that NWCPC has competition from other sources for this consumer group.

#### **5.4.6 Customers and potential customers living in informal settlements (slums)**

Analyses of the customer survey show that water kiosks are the main source of water to 70% of customers in this market segment. The main source of water for the rest of the customers is boreholes and wells (22%). Private operators manage almost all kiosks (98%). Piped connections are the main source of water to only 6% of customers in this market segment and handcart vendors are the main source of water for 2% of the customers. Households in this market segment use an average of between four and five 20-litre containers of water per day. Households use high quality water for drinking and cooking while low quality water is used for washing and other uses.

In addition to the customer survey, focus group discussions using the PREPP approach (Coates et al, 2004), were held in three informal settlements in order to triangulate information obtained from the survey. Findings from the customer survey were confirmed through focus group discussions held in three informal settlements. The focus groups held in each of the three informal settlements identified and discussed existing water sources. The groups ranked existing sources in order of most preferred (1<sup>st</sup> ranking) to least preferred. Table 16 shows the range and ranking of current water sources in the three informal settlements.

**Table 16. Table showing existing water sources and coping strategies (group ranking) in three informal settlements**

Service option	Kisumu Ndogo (men)	Kisumu Ndogo (women)	Muoroto Paradise (men)	Muoroto paradise (women)	VOK (men)	VOK (women)	Overall ranking of existing sources
Ordinary water kiosk	1	1	1	1	1	1	1
Kiosk with no structure	2	3	N/A	N/A	N/A	2	2
Water collected from shallow well (salty water)	N/A	N/A	2	2	N/A	N/A	2
Roof catchment	N/A	N/A	3	N/A	N/A	N/A	N/A
Borehole or well with pump (salty water)	3	5	N/A	N/A	2	3	4
Hand cart vendor (from kiosk or from wells and boreholes)	4	2	N/A	N/A	3	4	4
Water tanker (free water supplied during severe shortages)	N/A	4	N/A	N/A	N/A	N/A	N/A
Traditional source (pools of rain water, often muddy)	N/A	6	N/A	N/A	N/A	N/A	N/A

The above table shows there is a wide range of water sources in informal settlements with kiosks being the most preferred water source. All groups considered kiosks to be providing the best quality water. Most of the alternative water sources (apart from some handcart vendors) provide water of low quality that is only suitable for washing. Most households buy drinking water from kiosks or obtain from handcart vendors but use other sources for non-drinking water.

## 5.5 Competitor Analysis

The current situation with regard to infrastructure is represented in Table 17.

**Table 17. Percentage of piped water connections in different market segments**

Market Segment (by type of dwelling)	% of Piped Connections			Total
	Individual house connection	Shared connection	No water connection	
Bungalows / Maisonettes	93.4		6.6	100.0
Flats	77.6	12.1	10.3	100.0
1, 2 or 3 Roomed House or Swahili House	22.7	27.8	49.5	100.0
Dwelling in Informal Settlement or Slum	2.5	3.8	93.7	100.0
TOTAL:	45.2	11.9	42.9	100.0

The above table shows that existing competitors have come about to fill the vacuum left by NWPC. As a result of NWPC's inadequate services, customers also use other sources of water. The main source of water for customers in various market segments is shown in Table 10 (p. 28).

It should also be noted that there are illegal connections that constitute part of the competition. Because of their nature, illegal connections were not recorded in the customer survey, and the utility would need to implement a programme of discovering and registering them.

#### **5.5.1 Competitors in the bungalows & maisonettes market segment.**

The above table shows that NWPC is the main source of water to 59% of customers in this market segment. The main competitors in this market segment are customers through private boreholes and wells. Both handcart and water tanker vendors offer some competition to the utility. The market share that competitors command is as follows:

- Private boreholes and wells (28%)
- Hand cart water vendors (8%)
- Water tankers vendors (5%)

#### **5.5.2 Competitors in the flats market segment**

NWPC is the main source of water to 83% of customers in this market segment. NWPC has limited competition in this market segment from handcart vendors (7%), water kiosks (7%) and public boreholes and wells (3%). The market share that competitors command is as follows:

- Public boreholes and wells (3%)
- Hand cart water vendors (7%)
- Kiosks (7%)

Some of the water sold through kiosks comes from NWPC.

**5.5.3 Competitors in the Swahili houses market segment**

NWPC is the main source of water to 40% of customers in this market segment. 44% of customers use kiosks as their main source of water. Some of the water sold through kiosks comes from NWPC. The market share that competitors command is as follows:

- Kiosks (44%)
- Boreholes and wells (14%)
- Hand cart water vendors (2%)

**5.5.4 Competitors in the informal settlements (slums) market segment**

Most customers (94%) in this market segment do not have any (individual) water connections; NWPC directly serves only about 6% of customers in this segment. The main source of water for 70% of customers is kiosks. Some of the water sold through kiosks comes from NWPC. 75% of customers are satisfied with drawing water from kiosks. Of those who are not satisfied with services from kiosks, 34% cite inadequate quantity or pressure as the cause. 53% cite cost and 13% cite low quality as the cause for their dissatisfaction. The market share that competitors command is as follows:

- Kiosks (70%)
- Boreholes and wells (22%)
- Hand cart water vendors (2%)

Private operators manage most kiosks (98%) and community groups manage only 2%.

The focus group discussions held in three informal settlements revealed that potential customers in this market segment perceive the water obtained from NWPC’s pipelines to be of high quality. The following table (Table 18) shows the range of existing water sources and customers’ preferences indicated by the group ranking.

**Table 18. Existing water sources preferences in informal settlements**

Service	Kisumu	Kisumu	Muoroto	Muoroto	VOK	VOK	Overall
---------	--------	--------	---------	---------	-----	-----	---------

option	Ndogo (men)	Ndogo (women)	Paradise (men)	paradise (women)	(men)	(women)	ranking of existing sources
Ordinary water kiosk	1	1	1	1	1	1	1
Kiosk with no structure	2	3	N/A	N/A	N/A	2	2
Water collected from shallow well (salty water)	N/A	N/A	2	2	N/A	N/A	2
Roof catchment	N/A	N/A	3	N/A	N/A	N/A	N/A
Borehole or well with pump (salty water)	3	5	N/A	N/A	2	3	4
Hand cart vendor (from kiosk or from wells and boreholes)	4	2	N/A	N/A	3	4	4
Water tanker (free water supplied during severe shortages)	N/A	4	N/A	N/A	N/A	N/A	N/A
Traditional source (pools of rain water, often muddy)	N/A	6	N/A	N/A	N/A	N/A	N/A

“1” is most preferred, “6” is least preferred and “N/A” is not applicable to the informal settlement.

The above table shows there is a wide range of water sources in informal settlements with kiosks being the most preferred water source. All groups considered kiosks to be providing the best quality water. The focus group discussions revealed that the few people with connections receive water at low pressure and containers often take a long time to fill up. Most of the alternative water sources (apart from some handcart vendors) provide water of low quality that is only suitable for washing. Most households buy drinking water from kiosks or obtain from handcart vendors but use other sources for non-drinking water.

The demand for clean water through NWPC's pipelines is high as indicated by a high willingness to pay for improved water services. NWPC is therefore well placed to compete with other water sources in this segment.

### **5.5.5 Summary of competitor analysis in all market segments**

In order to meet existing competition, NWCPD should improve water services to customers who are already connected but are not receiving adequate services. NWCPD is therefore well placed to compete with other water sources in all market segments. The utility should also extend water services to customers who are presently not served.

## **5.6 PEST analysis of NWCPD)**

A PEST (Political, Environmental, Social and Technological) analysis of NWCPD was carried out as part of the institutional analysis in order to understand the environment in which NWCPD operate.

### **5.6.1 Political Analysis**

- As a government owned entity, NWCPD is under political pressure to improve services to existing customers and extend services to those not currently served.
- Some politicians may prefer that provision of water services remain in the public sector. Some may not favour necessary reforms in the water sector (such as commercialisation or private sector participation). This could be a threat to NWCPD.
- There may be political interference in the management of NWCPD (such as in appointment of the board of directors and some staff, disconnection of water to defaulters and supply of goods and services)
- There may be political reluctance to increase water tariffs, thus keeping tariffs below cost recovery levels, water being seen as a social service.
- There may be pressure and interference from international finance agencies such as the World Bank and others in management of NWCPD, mainly due to funding arrangements.

### **5.6.2 Environmental Analysis**

- It might not be environmentally feasible to provide a conventional water distribution network in informal settlements that are not connected to a wastewater collection system. It is perhaps only feasible to extend pipelines to a limited number of yard connections and kiosks for on selling. Lack of drainage in informal settlements poses environmental problems.
- Development of additional water supply infrastructure (water production and transmission facilities) has to meet the environmental impact assessment criteria.

### **5.6.3 Social Analysis**

- Water is considered a social necessity and so NWCP staff might face low social status caused by the current insufficient water supply to customers
- Enforcing payment for water through disconnection for some customers (such as hospitals and schools) might be socially unacceptable.
- 39% of Mombasa population is classified as absolute poor and living below the poverty line. (Urban poverty in Kenya is defined as those earning less than KSh2648 per capita a month). This constitutes a high proportion of NWCP's customers and potential customers. The customer survey found that though these people are poor, they have aspirations for high levels of service that they can hardly afford. Focus group discussions in three informal settlements estimated monthly household expenditure at KSh6683/= per month. This is about US\$0.5 per capita per day) assuming a family of six.
- The key macroeconomic indicators show that the Kenyan economy generally performed poorly in the 1990s due to local and global factors. The country is in its fourth successive year of economic stagnation (recession) and that is against a background of a decade of less than 2 per cent annual economic growth. The El Nino rains of 1997/98 and subsequent prolonged drought has made the situation worse. The continued slowdown in economic performance is reflected in virtually all the key sectors of the economy. Virtually all NWCP's customers and potential customers are adversely affected by the poor state of the economy.

#### **5.6.4 Technological Analysis**

Future water sources include distant ones such as Mzima and Nchoro springs, which have potential to meet water requirements in Mombasa and the coastal area at minimal energy costs. It is hoped that the Sabaki ground water source, though high on energy costs, will continue producing good yield, thus keeping treatment costs low. In terms of water supply infrastructure, there is no technological risk because water supply technology is known and has been tested.

NWCPC faces a persistent problem with billing computer hardware and software. Several systems have been installed without much success. Accurate billing in a fully metered distribution system with intermittent water supply is a big challenge to many water utilities in developing countries, and not just for NWCPC.

### **5.7 SWOT analysis of NWCPC**

Apart from PEST, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of NWCPC was carried out as part of an institutional analysis. NWCPC has key strengths that could enable the utility to exploit the enormous opportunities available in Mombasa and the coastal region. If the few weaknesses are attended to, the utility could reduce the existing threats and ensure survival. NWCPC has the potential to thrive and meet its objectives.

#### **5.7.1 NWCPC's Strengths**

NWCPC has several key strengths:

- NWCPC has an existing (though inadequate) water supply infrastructure
- NWCPC has experienced staff (though many are arguably not customer focused)
- All customers in Mombasa know NWCPC (even without advertising its services).
- NWCPC has good income from industrial and commercial customers, such as tourism.
- NWCPC has potential gravity water supply systems even though they are distant sources



### **5.7.2 NWPC's Weaknesses:**

- Water supply infrastructure is inadequate (especially water production transmission and distribution facilities)
- Low morale among staff (staff motivation is low), possibly due to low remuneration caused by poor financial performance, itself made worse by a combination of low tariffs and inefficient revenue collection system.
- Many staff not customer focused (lack of commercial attitude among staff and some in management). This can result to over-billing of some customers among other mal-practices.
- Customer database is inadequate and/or inaccurate
- Weakness in debt collection, due to a combination of factors such as unfavourable legal framework and revenue/debt collection system.

### **5.7.3 NWPC's Opportunities:**

- Legal mandate to operate water services in Mombasa as a monopoly
- Ready market for water as customers' requirements are not currently being met by suppliers
- Customers used to paying high charges for water services due to shortages
- High density urban settlement offer economies of scale for water distribution
- To capture a greater proportion of the water supply market particularly in low-income areas and informal settlements.
- Increasing income from industrial and commercial customers, especially tourism.
- Political support for reforms in the water sector, especially commercialisation of water services. This is a good opportunity for NWPC to transform itself into a thriving efficient and effective utility.
- Technically competent and potentially a good and efficient workforce, provided efforts are made to address staff motivation, and management inefficiencies

### **5.7.4 NWPC's Threats:**

NWPC's threats consists of:

- Competitors in the water market (vendors, private and public boreholes and wells)
- Low tariffs due to delay and/or inability to review tariffs

- Mombasa City does not have any water sources close by; All sources are far away with distances of between 50 and 220 kilometres.
- The cost of main production inputs (electricity and chemicals) is rising fast due to performance of local economy relative to the global economy.
- Influence of politics on the water sector, especially inability of NWCP to increase water tariffs at will.
- Reluctance of the World Bank to fund the new bulk water scheme that is urgently required, unless substantial private sector participation occurs.
- Competition for investment funds with other equally deserving sectors such as health, transport and education
- Subsidy that NWCP Mombasa and coastal region gives to other regions

Institutional improvements would need to be made in order to address the weaknesses identified in the institutional analysis.

## **5.8 Summary of NWCP's institutional analysis**

NWCP's main interest groups (or stakeholders) consist of the following:

- Its employees who expect good remuneration (salaries and allowances),
- Its customers who expect good services at reasonable cost,
- Its suppliers of goods and services (chemicals, electricity, pipes, fittings, stationery, etc) who expect continued business and prompt payments for goods supplied and services rendered, and
- The government (the shareholder) who expect NWCP to provide reliable water services to existing customers at reasonable costs, and for NWCP to extend water coverage to potential customers by financing new projects using profits made from its existing water supply infrastructure.

A look at NWCP's institutional analysis reveals that most of the above stakeholders are not satisfied with its present performance. Each of the stakeholders wishes that NWCP could improve its efficiency and effectiveness. NWCP has a low efficiency of operation as indicated by performance indicators commonly used in the water sector. The customers' perceptions of NWCP are that service delivery is often characterised by water shortages, intermittent supply at low pressure or no water at all.

This perception points to the need for NWCP to improve its efficiency and effectiveness. This can be done through institutional improvements.

The customer survey further revealed that only 46% of households in Mombasa receive water services directly from NWCP and even these do not receive continuous supply of water. Of those who receive water directly from NWCP,

- 46% receive for more than 4 hours
- 36% receive for 2 to 4 hours and
- 18% receive for less than 2 hours.

The average expenditure/total income ratio for NWCP (including headquarters and all regions) over 4 years (1995 to 1999) is 121% while the average expenditure/collections for NWCP Coast Region is 11% over the same period. This shows that the coast region is subsidising other regions. Despite the cross subsidy between regions, the overall financial status of NWCP is in need of improvement. The shareholder (government) continues to finance new water projects and is not receiving dividends from NWCP. It may be concluded from the foregoing that NWCP is not meeting its objectives and there is considerable room for improvement. It is therefore imperative that NWCP develop a strategic marketing plan so as to safeguard its future.

## 6. Where Does NWPC Want to be?

### 6.1 Review of Objectives

The aim of adopting a marketing approach in management of urban water services is to offer feasible service options, to obtain amounts that people are willing to pay and then to select the most popular service levels. The rationale is to give people what is possible, what they want and what they are willing to pay for. This management approach conforms to NWPC's objectives.

NWPC's mission is stated as follows:

"The Corporation is committed to providing a regular supply of high-quality water to its customers at an affordable price and at a reasonable profit to the corporation."

In order for NWPC to successfully work towards achieving its mission, it is necessary to improve the services it offers to customers, as they are stakeholders. It is also necessary to extend water services to those within Mombasa that are not receiving services. This includes people living in informal settlements (slums) whose population is increasing. The reason for this is to enable NWPC capture more of the water market and hence improve its financial position ("reasonable profit to the corporation") and also for purposes of equity ("to provide a regular supply of high quality water to customers"). NWPC should also improve its customer services. Since NWPC faces severe infrastructure constraints, attainment of these objectives will require investment in new infrastructure for bulk supply and distribution.

Successful achievement of these objectives has a better chance when water services are differentiated and priced to suit the requirements of respective market segments. Different service options could be adopted for different market segments, and priced according to customers' willingness to pay while taking into account the full cost of service provision.

A key area of improvement is customer services such as billing, revenue collection and general customer relations. These software issues ought to go hand in hand with infrastructure improvements and together constitute service quality. Improvements in service quality can result to enhancement of customers' perception of the value of the service. Customers are often willing to pay a premium for the increased service quality where service quality is defined as "*the degree of excellence intended, and the control of variability in achieving that excellence, in meeting the customer's requirements*" (Lovelock, 1992).

Success in improvements in service delivery is dependent on NWPC's pricing policies.

## 6.2 Proposed Pricing Policies

The proposed pricing policy is derived from the utility's objectives reflected in its mission statement. The part that is relevant to the pricing policy is the reference to "affordable price" and "reasonable profit". An indication of "affordable price" is obtained from the customers' willingness to pay (WTP). Whether or not the utility will make a "reasonable profit" will depend on how the total cost of providing water services to customers compares with the total revenue received by the utility from the sale of water to customers.

Financial objectives of a water utility determine the pricing policy and hence the tariff policy to be adopted. Development of a tariff policy requires consideration of the following key factors:

- Existing service levels,
- Existing tariffs and revenue,
- Water demand as demonstrated by customers' willingness to pay and
- Investment needs.

Conducting a customer survey helps reveal customers' preferences and perceptions on existing levels of service. The contingent valuation method can be used to determine the customers' willingness to pay (WTP). As a starting point, the Average Incremental Cost (AIC) method is considered suitable for determining levels of tariffs that a water utility would need to charge in order to meet investment costs for improved water services.

By comparing WTP data with AIC data, a water utility can develop a tariff policy that aims to meet the twin objectives of acceptability by customers while enabling the utility to be financially sustainable. An effective tariff policy is that which results in a level of tariffs that the water utility could successfully implement and achieve financial sustainability.

It is prudent for a water utility to aim for full cost recovery as a way of meeting the challenge of water provision for the rising urban population. Where possible, cross subsidy could be applied between service levels.

Both the customer survey and the infrastructure analysis carried out show that Mombasa is a capacity constrained city. In addition to other measures, it is necessary to increase the capacity of the water supply infrastructure in order to improve customer services.

In accordance with the principles of project finance, it is expected that revenues generated by the sale of water to customers will meet the full cost of improving the water supply infrastructure. It is therefore necessary to determine the level of tariffs that would be applied in Mombasa to support the new investment.

A water utility may base the level of tariffs on historical costs or future costs. Historical costs may be determined easily from a water utility's financial statements and then tariffs set accordingly to meet the utility's financial objectives. Future costs are more difficult to determine. Engineering studies are necessary to enable definition of future water projects whose costs and benefits are then estimated and tariff set accordingly.

Progressive water utilities apply the principles of project finance that seek to set tariffs to recover operation and maintenance costs plus full amortisation of the capital costs (O & M costs plus paying back any loans including interest).

For the new water project in Mombasa, it is considered appropriate to use the average incremental cost (AIC) method to calculate the future cost of water and hence set tariffs accordingly. The average incremental cost (AIC) represents the average or long run marginal cost over a longer period of time. Setting the tariff at AIC means that the tariff is equal to the average cost of producing water from the most recent or the next most feasible investment. As the cheapest nearby water sources are the first to be used, the marginal cost price will normally be higher than the price based on historical costs.

### **6.3 Projected Costs and Tariffs**

Projected costs and proposed tariffs are dependent on successful implementation of the proposed project to improve water services in Mombasa and the coastal area.

#### **6.3.1 Project Components and Costs**

Recent engineering studies concluded that there was need to improve bulk water supply and to strengthen the distribution network in Mombasa and the coastal area. Among other outputs, the studies defined two main project components:

- Bulk water supply development for Mombasa and
- Improvements to water distribution network in Mombasa.

##### *Bulk supply component*

The total construction cost of the bulk supply component was estimated in 1996 at US\$194.8 million (excluding land acquisition and consultancy services during construction). Assuming a 10% increase in cost since then and a further 4% to cover minimal consultancy services, the cost of construction is now estimated at US\$222.85 million.

The operation and maintenance costs for the bulk supply were estimated at US\$1.82 million per year for a 1.0 m<sup>3</sup>/s capacity pipeline. It is assumed that these costs will remain constant for the life of the project since flow of water is by gravity throughout the 220 km long pipeline.

#### *Improvements to water distribution network*

The construction cost for the component to improve the distribution network was estimated in 1996 at US\$54.0million (excluding land acquisition and consultancy services during construction). Assuming a 10% increase in cost since then and a further 4% to cover minimal consultancy services the cost of this component is now estimated at US\$61.78 million.

Operation and maintenance costs of the reticulation system have been assessed using Malindi area data, as it is readily available from the ongoing management contract. It is also appropriate to use Malindi data because most supply areas in Mombasa and the coastal region are understaffed, under provided with transport and equipment and have significant deficits in supply. The data from Malindi was adjusted to make it relevant to other areas.

Analysis of various NWPC's reports by consultants suggests that the optimal unit operation and maintenance cost for Baricho source bulk supply is US\$0.59 per m<sup>3</sup>. The optimal operation and maintenance costs for Mombasa distribution system with commercial management is estimated at about Ksh27/= (US\$0.37) per m<sup>3</sup>.

#### *Total capital costs for bulk supply and improvements in distribution network*

The total capital costs to implement both the bulk supply component and improvements in distribution network is estimated at US\$284.63 (about US\$285 million).

### **6.3.2 Determination of Average Incremental Cost (AIC)**

#### *Basis of the Average Incremental cost calculation*

The Average Incremental Cost (AIC) is determined by assuming that the most economic output is where Long Run Marginal Costs equal Long Run Marginal Revenue.

AIC is calculated by dividing the present value (PV) of all incremental capital, operating and maintenance costs (C) by the present value (PV) of the incremental consumption (W) over the design life of the facilities to be constructed.

$$\text{AIC} = \text{PV C} (\$) / \text{PV W} (\text{m}^3)$$

The present values are determined by discounting the cash flows and consumption quantities at a discount rate that equals the opportunity cost of capital to the national economy. The opportunity cost is taken to be the real value of resources used in the most desirable alternative. This formula is used to determine the AIC for different development scenarios for Mombasa and the coastal area.

### **6.3.3 Project Scenarios**

Two different scenarios for determination of the average incremental cost (AIC) for Mombasa are considered. The scenarios are based on implementing the two project components recommended by the recent engineering studies. It is assumed that NWCP succeeds in obtaining low interest, long term investment capital to undertake bulk supply development, transmission and distribution works. The following assumptions have been made to facilitate determination of AIC costs:

- Capital costs are only incurred at the end of construction period, after which the project starts to produce benefits.
- The only benefits delivered by the project are in form of revenue from sale of water. In practice, infrastructure projects, and more so water projects, deliver social and economic benefits, most of which cannot be easily quantified.
- Annual operation and maintenance (O & M) costs are constant. In many infrastructure projects, O & M costs increase over time as the infrastructure gets old. O & M costs could also reduce over time if management efficiency increases in the operations and maintenance phase of a project.
- The life of the project is assumed to be only 25 years for purposes of calculating the AIC. Most gravity based water projects deliver benefits for longer periods, sometimes as long as fifty to a hundred years. The existing Mzima pipeline water project is over 40 years old and still producing the same quantity of water it was producing 40 years ago at minimal operation and maintenance cost.
- The quantity of water produced by the infrastructure and sold to customers is constant throughout the life of the project. In conventional practice, some water projects operate at a low capacity on commissioning and achieve full production capacity a few years later as population and water demand increases. Since Mombasa is a capacity constrained city with suppressed demand, high willingness to pay but with problems of obtaining investment capital, it is assumed that the project now under consideration will be operated at full capacity soon after commissioning. Other projects will come on line after a few years to help meet the water demand of the growing population.



The total capital cost for both components is US\$285 million. Provision for rehabilitation of the system is made at US\$10 million. It is assumed that this amount will be spent in the 10<sup>th</sup> year after commissioning. It is assumed that the full costs of improving the water supply system will be met from water sales from the entire region. The following further assumptions are made:

- Financing is secured at 8% per annum with a grace period equal to the construction period so that repayments commence after commissioning when water is sold to customers.
- Management of the distribution system will be on commercial basis (The estimated costs assume that commercial management would be engaged).

The operation and maintenance cost for Sabaki (Baricho) water source has been estimated at US\$0.59 per m<sup>3</sup>. It is assumed that Marere and Tiwi maintain production at capacities of 12,000 and 6,000 respectively and that Baricho source maintains its present contribution of 72,000 m<sup>3</sup>/day. The total amount of water distributed by the strengthened network is assumed to be 176,400 m<sup>3</sup> (86,400+12,000+6,000+72,000).

Scenario 1 assumes a high level of management efficiency estimated at 15% unaccounted for water (UFW) and 90% bill collection efficiency. For this scenario, the average incremental cost of water is US\$1.08 per m<sup>3</sup>. With the present exchange rate of KSh73/= to the US\$, the Average Incremental Cost is about Ksh78.85/= per m<sup>3</sup>

Scenario 2 assumes a lower level of management efficiency at 20% unaccounted for water (UFW) and 85% bill collection efficiency. For this scenario, the average incremental cost of water is US\$1.21 per m<sup>3</sup>. With the present exchange rate of KSh73/= to the US\$, the Average Incremental Cost is about Ksh88.30/= per m<sup>3</sup>.

Detailed calculations for each of the two scenarios are presented in Annex 8.4

#### **6.3.4 Selected Scenario for Tariff Setting**

For purposes of setting tariffs the worst case scenario in terms of management efficiency, that is scenario 2 at 20% UFW and 85% bill collection efficiency is selected. In order to break even, the average tariff should be set equal to the Average Incremental Cost (AIC), that is US\$1.21 per m<sup>3</sup> (Ksh88.30/= per m<sup>3</sup>).

Assuming that water is available throughout the day, a middle class person living in a bungalow or maisonette in a well-planned residential area of Mombasa with an individual house connection would probably consume about 150 litres per day. Since the average number of people in a household is six, the total monthly consumption for such a household 27 m<sup>3</sup> per month. Using the average tariff according to the AIC calculation, the household described here would pay the utility KSh2384/= per month as the monthly water bill.

From considerations of cost of water provision, an average tariff of US\$1.21 per m<sup>3</sup> (or Ksh88.30/= per m<sup>3</sup>) is sufficient for the utility to break even. Tariff design requires other considerations, such as customers' willingness to pay (WTP). Willingness to pay studies yield useful results when the bidding game starts at a level that reflects what is likely to be the cost covering tariffs. The results of this calculation were therefore used to inform the starting point of the bidding game. The monthly water bill for the highest level of service was set at KSh2500/= per month, a little (5%) higher than the estimated level of KSh2384/= per month.

The next section looks at the results of the willingness to pay (WTP) survey in order to develop the tariff policy.

## **6.4 Proposed and feasible options**

It is proposed to offer different service options at different prices, to various market segments from the menu of options. The proposed service options offer varying levels of service with different management and payment systems.

### **6.4.1 Market segments 1 and 2: People who in Bungalows, Maisonettes or Flats in planned areas.**

Three levels of service (service levels 1, 2 and 3) were offered to households who live in a bungalow or maisonette constructed of permanent building materials, or in a flat, located in a well planned area, or in an area where the planning process is in progress. The building should either have a water connection with internal plumbing, or has the capacity for a water connection with internal plumbing in the future.

*Service level 1: Continuous water supply to an individual house connection in a planned area with bungalows, maisonettes or flats*

Good quality piped water through the customers' individual house connection with adequate pressure to be able to reach second floor of a storey building, with continuous supply.

The proposed price range is KSh1200/- to KSh2500/- per month (highest tariff informed by AIC calculation).

*Service level 2: 12-Hour water supply to an individual house connection in a planned area with bungalows, maisonettes or flats*

Good quality piped water through the customers' individual house connection with adequate pressure to be able to reach a roof tank of a bungalow or maisonette, supplied on rationing basis, with about 12-hour water supply every day.

The proposed price range is KSh800/-to KSh1200/- per month.

*Service level 3: 4-Hour water supply to an individual house connection in a planned area with bungalows, maisonettes or flats*

Good quality piped water through the customers' individual house connection with adequate pressure to be able to reach a roof tank of a bungalow or maisonette, supplied on rationing basis, with at least 4-hours water supply every day, to be provided at suitable times in the morning and evening.

The proposed price range is KSh500/-to KSh800/- per month.

**6.4.2 Market segment 3: People who live in 1, 2 or 3 roomed dwellings and Swahili houses in planned areas**

Four levels of service (service levels 4, 5, 6 and 7) are offered to households who live in shared buildings constructed of permanent or semi- permanent building materials and located in a planned area. This includes 1, 2 or 3 roomed dwellings and Swahili houses with or without internal plumbing located in planned areas of the city. Dwellings in this category do not have an individual water connection. Residents will most likely have a yard tap serving a number of families who live in the shared building. Water services may be extended inside the dwellings when owners carry out internal plumbing in the future.

*Service Level 4: Continuous water supply to a shared yard connection in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses*

Good quality piped water through a shared yard connection with adequate pressure to be able to reach second floor of a storey building, with continuous supply providing enough water at the tap in the compound of the dwelling. Water is available continuously for 24 hours every day. Households obtain water from the tap in the compound any time of the day or night. Households may extend water inside their dwellings whenever they carry out plumbing.

The proposed price range is KSh1200/-to KSh2500/- per month.

*Service Level 5: Continuous water supply to a shared yard connection with storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses*

Good quality piped water through a shared yard connection providing enough water at the tap in the compound of the dwelling. The utility provides a storage tank next to the shared yard connection so that the tank receives and stores water. Households can draw water from the yard connection continuously even during the rationing hours because of the storage tank. When plumbing in the dwelling is done, water can be extended inside the dwelling.

The proposed price range is KSh1200/-to KSh2500/- per month.

*Service Level 6: 12-Hour water supply to a shared yard connection without storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses*

Good quality piped water through a shared yard connection providing water at a tap in the compound. Water is supplied on rationing basis for 12 hours every day. Households obtain water from the tap in the compound. Households can extend water inside the dwelling whenever plumbing in the dwelling is done.

The proposed price range is KSh800/-to KSh1200/- per month.

*Service Level 7: 4-Hour water supply to a shared yard connection without storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses*

Good quality piped water through a shared yard connection providing water at the tap in the compound. Water is supplied on rationing basis, in the morning and evening for a minimum period of 4 hours every day. Households can obtain water from the tap in the compound only in the mornings and evenings for a total of 4 hours. When plumbing in the dwelling is done, water can be extended inside the dwelling.

The proposed price range is KSh500/-to KSh800/- per month.

#### **6.4.3 Market segment 4: People living in informal settlements (slums)**

Six levels of service (service levels 8, 9, 10, 11, 12 and 13) were offered to people living in informal settlements. This market segment consists of households who live in individual or shared dwellings constructed of temporary building materials such as recycled timber, packaging or mud walls with recycled corrugated iron sheet or polythene roof. Such dwellings are located in unplanned areas known as informal settlements or slums. Slums or informal settlements do not have infrastructure services such as roads and drainage. Dwellings do not have internal plumbing. Space for a yard tap and a storage tank (to be shared by about 10 dwellings) might be found if attempts are made to upgrade the slum and provide water services.

*Service level 8: Continuous water supply to a shared yard connection with storage tank in an informal settlement*

Good quality piped water through shared yard connection (shared by about 10 dwellings) providing water at the tap in the compound of the dwelling. The utility provides a pipeline, a storage tank, and a shared connection next to your dwelling so that the tank receives and stores water. Households share the connection and the storage tank and draw water from the yard connection continuously even during the rationing hours because of the storage tank. Because of this storage tank, households can obtain water from the tap in the compound for 18 to 24 hours a day.

The proposed price range is KSh1200/-to KSh2500/- per month.

*Service Level 9: 12-Hour supply to a shared yard connection in an informal settlement without tank*

Good quality piped water through shared yard connection (shared by about 10 dwellings) providing water at the tap in the compound of the dwelling. The utility provides a pipeline that supplies water to the shared connection next to your dwelling on rationing basis for about 12 hours every day. Households obtain water from the tap in the compound shared with about 10 dwellings.

The proposed price range is KSh800/-to KSh1200/- per month.

*Service Level 10: 4-Hour supply to a shared yard connection in an informal settlement without tank*

Good quality piped water through shared yard connection (shared by about 10 dwellings) providing water at the tap in the compound of the dwelling. The utility provides a pipeline that supplies water to the shared connection next to your dwelling on rationing basis for 2 hours in the morning and 2 hours in the evening, a maximum period of 4 hours every day. Households obtain water from the tap in the compound shared with about 10 dwellings.

The proposed price range is KSh500/-to KSh800/- per month.

*Service level 11: Privately managed water kiosk with shelter and storage tank in an informal settlement*

Good quality piped water through an improved water kiosk that is provided with a shelter (suitable building), a storage tank and several taps. The improved water kiosk obtains water from the utility's pipelines. The kiosk is metered and is privately managed by an operator who pays the water bill for the water sold to NWCP. The kiosk is open from 7 a.m. to 7 p.m. daily, and good quality water from the NWCP pipeline is available throughout the day with adequate pressure.

The proposed price range is KSh3/-to KSh7/- per 20-litre container bought from the kiosk. (This price was informed by existing prices and is higher than AIC).

*Service level 12: Community managed water kiosk with shelter and storage tank in an informal settlement*

Good quality piped water through an improved water kiosk that is provided with a shelter (suitable building), a storage tank and several taps. The improved water kiosk obtains water from the utility's pipelines. The kiosk is metered and is managed by a community group. The community group operates the kiosk and then pays water bills to NWCP for the water consumed as measured by the water meter. The kiosk is open from 7 a.m. to 7 p.m. daily, and good quality water from the NWCP pipeline is available throughout the day with adequate pressure.

The proposed price range is KSh1/-to KSh6/- per 20-litre container bought from the kiosk. (This price is higher than AIC; it was informed by existing prices).

*Service level 13: Privately managed ordinary water kiosk without shelter or storage tank in an informal settlement.*

Good quality piped water through an ordinary water kiosk (a tap without any storage tank or structure) supplied with water by NWCP pipeline through a water meter to record consumption. An operator privately manages the water kiosk and sells water in units of 20 litres and then pays water bills to NWCP. The kiosk is open from 7 a.m. to 7 p.m. daily.

The proposed price range is KSh1/-to KSh4/- per 20-litre container bought from the kiosk. (This price was informed by existing prices and is higher than AIC).

## **6.5 Willingness to Pay for Selected Options**

A key aspect of the SMP is to offer feasible service options, to obtain amounts that people are willing to pay and then to select the most popular service levels. The rationale is to give people what is possible, what they want and what they are willing to pay for.

### **6.5.1 Willingness to pay (WTP) using contingent valuation method (CVM)**

The contingent valuation method (CVM) was used to estimate the amount of money that households are willing to pay (WTP) for various service options. Different service options were offered to respondents according to their market segments and their willingness to pay was obtained. Market segmentation was done on the basis of type of dwelling. Combinations of quota, stratified and random sampling techniques were used to select the households to be interviewed. The 312 households interviewed were spread over the four geographical locations in Mombasa and represented all the four market segments. Respondents were requested to state the amount of money they are willing to pay for the stated service option.

The results of the willingness to pay studies reveal that both customers and potential customers are willing to pay substantial amounts for improved water services. Willingness to pay levels is generally much higher than the existing utility water tariffs. In addition, respondents were willing to pay for service levels higher than they are receiving at present. The full results of willingness to pay for each service option (including charts) are presented in the annex. The focus group discussions held in three informal settlements confirmed the results of the willingness to pay study that was also conducted in informal settlements. A summary of willingness to pay for different service options in different market segments is presented in the tables below (see Tables 19 – 21).

**Table 19. WTP for options offered to people living in Bungalows, maisonettes and flats**

Service level (option)	Brief Description of service option	Market Segment	Percentage of respondents within market segment who bid for the stated service option	Weighted Mean WTP (KSh)	Amount which 2/3 of respondents who bid are WTP (KSh)
Service level 1	Continuous supply at House connection	People living in Bungalows, Maisonettes and Flats	99%	1568	1217
Service level 2	12-Hr supply at House connection	Ditto	97%	858	850
Service level 3	4-Hr supply at House connection, rationing	Ditto	32%	341	250

**Table 20. WTP for options offered to people living in 1,2 or 3 roomed dwellings and Swahili houses**

Service level (option)	Brief Description of service option	Market Segment	Percentage of respondents within market segment who bid for the stated service option	Weighted Mean WTP (KSh)	Amount which 2/3 of respondents who bid are WTP (KSh)
Service level 4	Continuous supply at yard connection	People in 1,2 or 3 Roomed dwellings & Swahili Houses	100%	1124	834
Service level 5	Continuous supply with storage tank at shared yard connection	Ditto	100%	1023	800
Service level 6	12-Hr supply at shared yard connection, rationing	Ditto	62%	537	447
Service level 7	4-Hr supply at shared yard connection	Ditto	54%	395	336



**Table 21. WTP for options offered to people living in informal settlements**

Service level (option)	Brief Description of service option	Market Segment	Percentage of respondents within market segment who bid for the stated service option	Weighted Mean WTP (KSh)	Amount which 2/3 of respondents who bid are WTP (KSh)
Service level 8	Continuous supply with storage tank at shared yard connection (about 10 dwellings)	People living in dwellings in informal settlements (slums)	98%	1103	592
Service level 9	12-Hour supply at shared yard connection (about 10 dwellings), rationing	Ditto	95%	610	500
Service level 10	Ditto but 4-Hour supply	Ditto	63%	302	236
Service level 11	Privately managed kiosk with shelter and tank	Ditto	54%	3/50 per 20-litre container	3/25 per 20-litre container
Service level 12	Community managed kiosk with shelter & tank	Ditto	48%	3/= per 20-litre container	2/65 per 20-litre container
Service level 13	Privately managed kiosk, no shelter or tank	Ditto	10%	1/50 per 20-litre container	1/60 per 20-litre container

### **6.5.2 Estimate of willingness to pay (WTP) using focus group discussions**

In addition to the willingness to pay study using the contingent valuation method, focus group discussions using the PREPP approach (Coates et al, 2004) were held in three informal settlements in order to obtain customers perceptions of existing water services and their preferences for improved service options. Participants of the focus group discussions were drawn from different parts of the informal settlement. In order to create a relaxed environment, men and women held separate group discussions to discuss the same issues in each informal settlement. Each group had a facilitator, an assistant, a reporter and a water engineer to explain the menu of water service options. A menu of service options priced at different levels were offered to the focus groups and discussed. The groups discussed advantages and disadvantages of each service option as well as the cost attached to the option.

### **6.5.3 Group ranking of priced service options by all participants (consensus)**

The focus groups ranked the options in order of preference, with the most preferred being ranked 1<sup>st</sup> position and least preferred 6<sup>th</sup> position. Table 6 (p. 10) shows the results of group ranking of service options by each of the three informal settlements and by gender. The table shows that customers have greater preference for community and privately managed kiosks than for shared yard connections.

### **6.5.4 Individual ranking of priced service option through voting by each participant (secret ballot)**

After the group ranking, individual participants were also given an opportunity to rank the options individually by secret ballot. Each participant was given three ballots: large, medium and small. Participants were requested to vote for the most preferred option using the large ballot (3 points) and for the second and third most preferred using the medium (two points) and small (one point) ballot respectively. The votes given by participants to each option were added together and the options ranked, with the most preferred option being ranked 1<sup>st</sup> position and least preferred 6<sup>th</sup> position.

Table 7 (p. 11) shows that community and privately managed kiosks are in higher demand than shared yard connections. The table shows the results of individual ranking of service options by participants in each of the three informal settlements and by gender. The results of individual ranking were different from those of the group ranking.

### 6.5.5 Selection of service and management options

In selecting which service options to provide to which market segment, it is important to consider existing service levels and willingness to pay for each segment. The existing service levels are summarised in the Table 11 (p. 29).

The table shows that about 30% of people living in bungalows, maisonettes and flats are receiving a continuous supply of water. Since willingness to pay for continuous supply of water is high, it is proposed to offer this service to customers in the first two market segments. In order to reduce the risks associated with promising a high level of service, it is proposed to redefine a continuous water service to be that service where water is available for between 12 and 24 hours. It is possible for the utility to provide this service since most customers (79%) already have individual water storage that can last for 2 days or more.

Table 22 below shows that 79% of households have 2 days water storage or more.

**Table 22. Water Storage Time (in days)**

Water Storage Time (in days)	Frequency	Percentage	Valid Percentage	Cumulative Percentage
> 5	60	19.2	19.3	19.3
5	14	4.5	4.5	23.8
4	19	6.1	6.1	29.9
3	60	19.2	19.3	49.2
2	92	29.5	29.6	78.8
1	66	21.2	21.2	100.0
TOTAL:	311	99.7	100.0	
Missing – Not Applicable	1	0.3		
TOTAL:	312	100.0		

The above table also shows that it not necessary for the utility to provide additional storage at the point of consumption. The normal storage provided for strategic reasons and balancing flows in the city is adequate. An alternative view is that the utility could provide a storage tank at the yard connection to store water and enable customers to draw water from the tank even when there is no water in the pipeline.

Results of willingness to pay studies show that there is demand for the following 9 out of the 13 service options offered:

- Service level 1: Continuous water supply to an individual house connection in a planned area with bungalows, maisonettes or flats
- Service level 2: 12-Hour water supply to an individual house connection in a planned area with bungalows, maisonettes or flats
- Service Level 4: 24-Hour supply at yard connection
- Service Level 5: 24-Hour supply at yard connection (with storage tank)
- Service Level 6: 12-Hour supply at yard connection (without storage tank)
- Service Level 8: 18-24 Hour supply at yard connection with storage tank shared by about 10 dwellings in informal settlements
- Service Level 9: 12 Hour supply at yard connection shared by about 10 dwellings in informal settlements
- Service Level 11: Privately managed water kiosk with shelter, storage tank and several taps
- Service Level 12: Community managed water kiosk with shelter, storage tank and several taps

It is proposed that a service option for which willingness to pay (WTP) is low should not be offered. The following 5 out of 13 service levels offered are not popular as they only have minimal demand:

- Service Level 3: 4-Hour supply at individual house connection (with rationing) to people living in bungalows, maisonettes and flats
- Service Level 7: 4-Hour supply at yard connection (with rationing) to people living in 1,2 or 3 roomed dwellings and Swahili houses.
- Service Level 10: 4-Hour supply at yard connection shared by about 10 dwellings in informal settlements
- Service Level 13: Privately managed ordinary water kiosk without shelter or storage tank.

Results willingness to pay show demand for yard connections in informal settlements. During the focus group discussions conducted in the informal settlements, all the groups expressed reservations about management of shared yard connections. Participants said that there would be disagreements on how to share the bill since consumption would vary from one household to the other and there would be no control over use of water. For this reason and also considering environmental factors (such as drainage), shared yard connections will be offered only to suitably selected locations in informal settlements.

It is proposed to merge some service levels and provide the following service options:

- Service level 1: 12-24 Hour supply at individual house connection to people living in bungalows, maisonettes and also in flats (former service levels 1 and 2 merged into one service).
- Service level 2: 12-24 Hour supply at shared yard connection with a storage tank in 1,2 or 3 roomed dwellings and Swahili houses.
- Service level 3: 12-24 Hour supply at shared yard connection (without storage) in 1,2 or 3 roomed dwellings and Swahili houses, and also in informal settlements.
- Service level 4: 12-24 Hour supply at shared yard connection with a storage tank shared by about 10 dwellings in informal settlements. This service to be offered at suitably selected areas in informal settlements taking environmental considerations into account. (Former service levels 8 and 9 merged)
- Service level 5: 12-24 Hour supply at improved water kiosks (storage and structure provided) in areas with 1,2 or 3 roomed dwellings and Swahili houses and also in informal settlements for sale through privately managed kiosks. (Former service level 11)
- Service level 6: 12-24Hour supply at improved water kiosks (storage and structure provided) in areas with 1,2 or 3 roomed dwellings and Swahili houses and also in informal settlements for sale through community managed kiosks. (Former service level 12)

## **6.6 Estimates for Option Take Up**

Estimates for option take up are made on the basis of population distribution and customers' willingness to pay, which is an indication of demand for service options.

### **6.6.1 Population distribution in Mombasa**

According to preliminary results of the 1999 census, Mombasa population was estimated at 700,000. Population distribution according to market segments is estimated to be as follows:

Proportion of population living in Bungalows & Maisonettes	=25%
Proportion of population living in flats	=15%
Proportion of population living in 1,2 or 3 roomed dwellings & Swahili Houses	=40%
Proportion of population living in informal settlements	=20%

Population is concentrated in the low-income areas. Global trends and data on the country's economic indicators show that the above population distribution is likely to remain as it is in the medium and long term.

### **6.6.2 Estimates for option take up (Product positioning)**

*Service level 1: 12-24 Hour supply at individual house connection.*

This service will be offered to people living in market segments 1 and 2 (those living in bungalows, maisonettes and also in flats).

Based on the results of the willingness to pay study, it is estimated that all (100%) customers in these two market segments will take up this service option.

*Service level 2: 12-24 Hour supply at shared yard connection*

This service will be offered to people living in 1, 2 or 3 roomed dwellings and Swahili houses. The service will also be offered to people living in selected parts of informal settlements, taking environmental factors into account. It is estimated that 90% of customers in 1, 2 or 3 roomed dwellings and Swahili houses will take up this service option. It is further estimated that 10% of customers living in informal settlements will take up this service option.

*Service level 3: 12-24 Hour supply at privately or community managed improved kiosks*

There are a few customers living in 1, 2 or 3 roomed dwellings and Swahili houses who do not wish to share connections and thus pay monthly water bills. The utility will provide water to improved water kiosks in this market segment to serve such customers. Private operators or community groups may manage the kiosks. It is estimated that 10% of customers living in 1, 2 or 3 roomed dwellings and Swahili houses will meet their water requirements through kiosks.

The utility will extend water pipelines to viable parts of informal settlements to sell water to improved water kiosks. The water kiosks will serve as water distribution points with the aim of reaching all customers in informal settlements. Private operators or community groups may manage the kiosks according to demand. It is estimated that 90% of customers in informal settlements will meet their water requirements through kiosks.

The estimates for option take up are summarised in Table 23 below.

**Table 23. Take up of service options by Market segment**

Market segment by type of dwelling	Percentage of population in market segment	Estimated Population in Market segment	Service options and proportion of take-up
Bungalows & Maisonettes	25%	175,000	<ul style="list-style-type: none"> <li>• 12-24Hour supply at individual house connection (100%)</li> </ul>
Flats	15%	105,000	<ul style="list-style-type: none"> <li>• 12-24Hour supply at individual connection (80%)</li> <li>• 12-24Hour supply through shared connection (20%)</li> </ul>
1,2 or 3 roomed dwellings & Swahili Houses	40%	280,000	<ul style="list-style-type: none"> <li>• 12-24Hour supply at individual connection (25%)</li> <li>• 12-24Hour supply at shared yard connection (30%)</li> <li>• 12-24Hour supply at shared yard connection with storage tank (30%)</li> <li>• Privately managed kiosks with storage (10%)</li> <li>• Community managed kiosks with storage (5%)</li> </ul>
Informal settlements (Slums)	20%	140,000	<ul style="list-style-type: none"> <li>• 12-24Hour supply at shared yard connection (10%)</li> <li>• 12-24Hour supply at shared yard connection with storage tank (10%)</li> <li>• Privately managed kiosks with storage (40%)</li> <li>• Community managed kiosks with storage (40%)</li> </ul>
Total	100%	700,000	

## 6.7 Projected Revenues

Projected revenues are calculated from consumption estimates, assumed take up of service options, proposed tariffs based on willingness to pay, equity and the need for financial sustainability.

### 6.7.1 Estimated consumption

It is assumed that consumption will vary with the service option provided to the market segment and the segment's willingness to pay. As billing will be based on metered consumption, the water tariff will also influence the actual consumption.

It is estimated that people living in bungalows and maisonettes, and who are supplied with water for 12-24 hours at individual house connections (100%) will consume an average of 150 litres/capita per day.

It is further estimated that people living in flats and supplied with water for 12-24 hours at individual connections (80%) will consume an average of 100 litres/capita per day. Those living in flats and with shared connections (20%) are also expected to consume an average of 100litres/capita per day.

People living in 1,2 or 3 roomed dwellings and Swahili houses and supplied with water for 12-24 hours through individual connections (25%) will also consume an average of 100 litres/capita per day while those with shared yard connections (60%) will consume an average of 60 litres/capita per day. It is estimated that people living in this market segment and who will obtain water from privately or community managed water kiosks (15%) will consume an average of 20 litres/capita per day.

People living in dwellings in informal settlements who will be supplied with water for 12-24 hours through shared yard connections (20% of market segment) are also estimated to consume an average of 60litres/capita per day. It is estimated that the balance of 80% of people living in dwellings in informal settlements who will obtain water from privately or community managed water kiosks will consume an average of 20 litres/capita per day.

The volume of water sold through each of the service options to different market segments can be calculated using the population distribution, assumed option take up and the above consumption estimates. This calculation is moderated using the results of willingness to pay study.



### 6.7.2 Estimates of proposed tariffs

For purposes of this SMP, in order to meet the full costs of acceptable water services while taking into account customers' willingness to pay and equity, the following tariffs are proposed:

12-24 Hour supply at individual house connection	KSh60/m <sup>3</sup>
12-24 Hour supply at shared house (flat) connection	KSh55/m <sup>3</sup>
12-24 Hour supply at shared yard connection with storage	KSh50/m <sup>3</sup>
12-24 Hour supply at shared yard connection (no storage)	KSh45/m <sup>3</sup>
12-24 Hour supply at improved water kiosks for resale	KSh25/m <sup>3</sup> (resale tariff to be determined by the market)
12-24 Hour supply to commercial, industrial or institutional customers	KSh120/m <sup>3</sup>

### 6.7.3 Estimates of projected revenue

Detailed calculations for projected revenue are presented in the annexes. The results of the calculations are presented in Table 24 below.

**Table 24. Projected revenue**

Proposed water supply options	Expected volume of water sold and paid for (m <sup>3</sup> /yr)	Proposed water tariffs based on WTP survey (KSh/m <sup>3</sup> )	Projected income from each option (KSh)
12-24 Hour supply at individual House connection	14 691 250	60	881 475 000
12-24 Hour supply at shared House (flat) connection	766 500	55	42 157 500
12-24 Hour supply at yard connection with utility storage tank	2 146 200	50	107 310 000
12-24 Hour supply at yard connection (no utility tank)	2 146 200	45	96 579 000
12-24 Hour supply at water kiosks with storage and structure (privately or community managed)	1,124,200	25	28,105,000
12-24Hour supply to commercial, industrial and institutional customers	22 925 650	120	2 751 078 000
<b>Total</b>	<b>43,800,000m<sup>3</sup></b>		<b>KSh3 906 704 500</b>

The table shows that the total estimated projected revenue for the utility is KSh3 906 704 500 per annum. The estimated proposed average water tariff is KSh89/20 (about US\$1.20) per m<sup>3</sup>.

Assuming that the total annual costs to cover both capital and recurrent expenditure remains at the estimated amount of KSh3, 854,400,000, then the utility could potentially make a modest profit amounting to KSh52 304 500 (about US\$716 500) per annum, if this plan were to be implemented (Provision for depreciation should, of course, be included in the estimates for annual expenditure)

## **7. How Might NWCP Get There?**

In order for NWCP to meet its objectives that include improving customer services and attaining financial sustainability, there is need for investment in new infrastructure and improvements in management.

### **7.1 Infrastructure improvements**

In order for the utility to provide services adequately and reliably, it is necessary to invest in new infrastructure, especially new sources of water. The utility recently commissioned engineering consultancy firms to undertake engineering studies and define the next investment project for Mombasa. The studies confirmed that Mombasa was experiencing severe water shortages, mainly because the existing water supply infrastructure does not meet the water requirements of customers. The studies concluded that there was need to improve bulk water supply to the city and also to strengthen the distribution network. Among other outputs, the studies defined two main project components:

- Bulk water supply development for Mombasa and
- Improvements to water distribution network in Mombasa.

#### **7.1.1 Bulk supply development**

The most feasible bulk supply investment for Mombasa was identified to be the second Mzima pipeline. The second Mzima pipeline was proposed as the most favourable short/medium term solution to satisfy the growing water demand at Mombasa and in the coastal region on the basis of cost, reliability and simplicity of operation. The amount of water abstraction for the second Mzima pipeline project was set at 1.0 m<sup>3</sup>/s (86,400 m<sup>3</sup>/day) in order to meet environmental considerations. The project comprises abstraction works (the Sourceworks), the main 220 km long transmission pipeline to Mazaras, additional storage and the extension pipelines for bulk distribution of supplies to Mombasa.

#### **7.1.2 Improvements to water distribution network in Mombasa**

Apart from improving bulk supply of water to Mombasa, it is necessary to rehabilitate and strengthen the distribution system to allow efficient distribution of the additional bulk supply and also to reduce unaccounted for water (UFW). The engineering studies assessed the existing distribution system and proposed improvements aimed at

- Providing adequate supply to all customers with a distribution network that can satisfy target water demand (2020)
- Reducing water losses

### **7.1.3 Improvements to sewerage infrastructure in Mombasa**

It is good environmental engineering practice to improve the sewerage system whenever any improvements in bulk supply and water distribution are being considered. Provision of additional water to customers invariably leads to additional waste water that needs to be collected, treated and disposed of.

This SMP assumes that the costs of improving the water system include those for improving the sewerage system. Similarly, since current water bills in Mombasa already include a component for sewerage charges (based on a percentage of water consumption), the projected revenue will cater for both water and sewerage. This assumption is made on the basis that separate billing for sewerage is not considered feasible as no sanctions can reasonably be effected if customers default in payments for sewerage services.

### **7.1.4 Criteria for selection of infrastructure investment project**

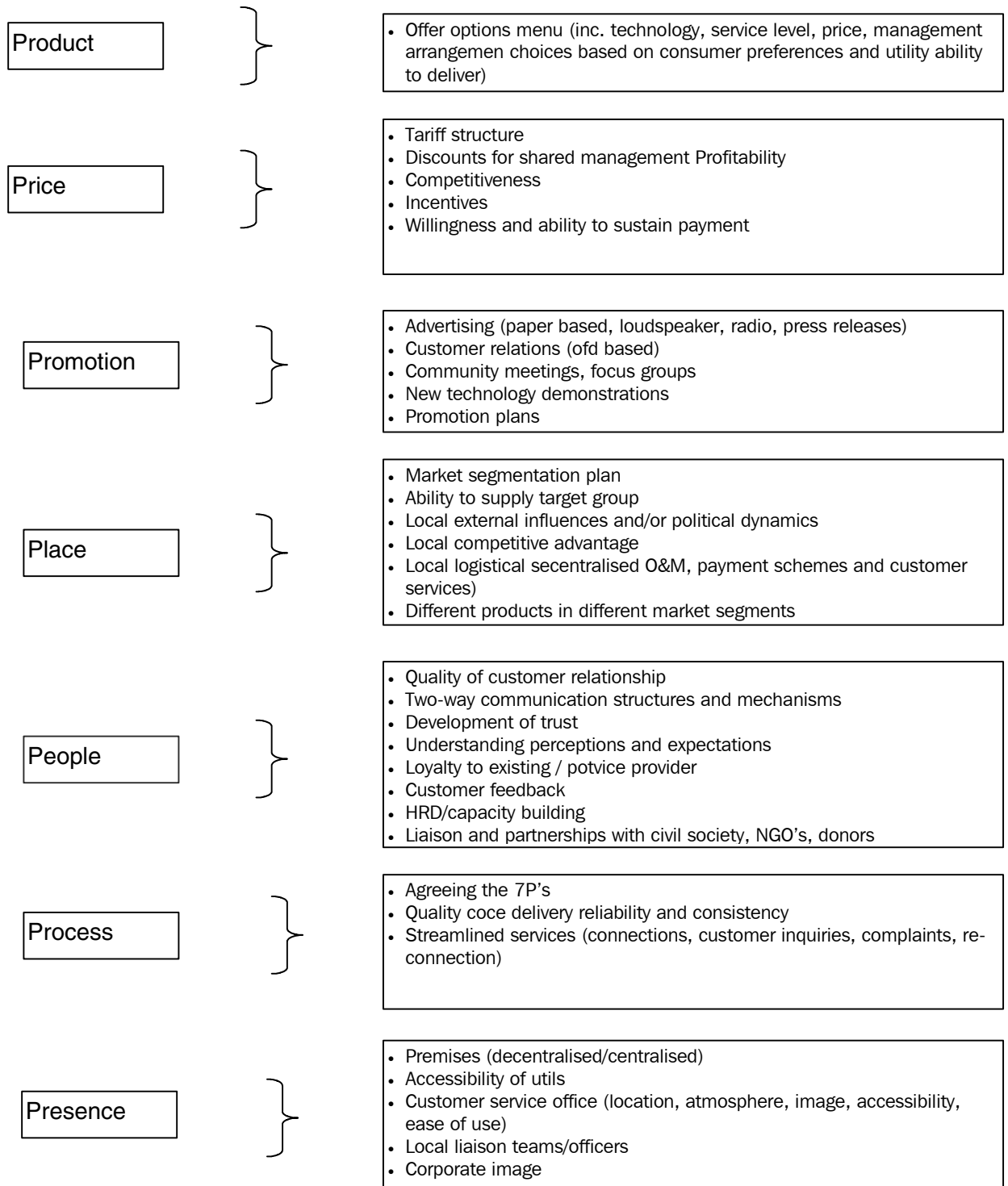
There are technical, environmental and economic reasons for selection of the bulk supply source. Detailed justification of the selected option is beyond the scope of this SMP (Project details can be found in consultancy reports on the recently concluded Second Mombasa and Coastal Water Supply: Engineering and Rehabilitation project). The selected development option is the most feasible technically and economically and it also meets environmental considerations.

It is assumed that the utility will be able to secure the required funding (US\$285million) for bulk supply development, transmission and improvements to the distribution system. It is further assumed that for reasons of equity, all utility's customers in coast region will contribute to financing of this development project. In order to finance this investment successfully, NWCPD will need to charge an average tariff of Ksh88.30/= per m<sup>3</sup> to customers in Mombasa and the coastal area. Thus, apart from improving the water supply infrastructure, NWCPD also needs to market services to existing and potential customers.

## **7.2 Marketing strategies for water services**

Improvements in management of water services include marketing of water services in all market segments. The marketing mix or the 7p's of marketing (product, price, promotion, place, people, process and presence) are key aspects to be reviewed by the utility in order to respond adequately to demand in respective market segments. A typical marketing mix for the water sector is shown in Figure 10 below.

**Figure 10. A typical Marketing Mix (7 P's ) for a water utility**



(Adapted from Booms and Bitner, 1981 cited by Brassington and Pettitt, 2000)

### **7.2.1 People dwelling in bungalows and maisonettes**

Almost all customers (94%) in this market segment have individual connections. NWPC is currently the main source of water to 59% of customers in this market segment. 25% use private wells or boreholes as their main source of water because water supply by NWPC is insufficient. NWPC clearly has a competitive advantage in this market segment. 35% of customers do not receive water directly from NWPC. Only 30% of customers receive a continuous supply of water. These figures show that the main marketing strategy for NWPC is to increase water supply to customers while promoting the quality aspects of the water. In order for NWPC to utilise its competitive advantage in this market segment and improve its revenue position, it needs to improve water services.

The water utility (NWPC) should:

- Increase the quantity of water and also pressure; this calls for additional investment in source-works (water production), transmission and distribution.
- Read meters regularly and bill customers on actual meter readings (consumption)
- Prepare and despatch water bills to customers promptly
- Repair or replace broken down meters
- Improve general customer service (this could be done by training all NWPC staff who have contact with customers on customer service, relations and management).

### **7.2.2 People living in Flats**

NWPC is the main source of water to 83% of customers in this market segment. NWPC has limited competition in this market segment from handcart vendors (7%), water kiosks (7%) and public boreholes and wells (3%). 17% of customers do not receive water directly from NWPC. Only 31% of customers receive a continuous supply of water. NWPC could utilise its competitive advantage in this market segments by:

- In the short term, invest in construction of water kiosks at strategic locations in order to sell water to those who cannot receive it in their flats through their individual connections due to low pressure. The kiosks could be improved by provision of a storage tank to enable drawing of water using multiple taps and hence reduce queues.
- Read meters regularly and bill customers on actual meter readings (consumption)
- Prepare and despatch water bills to customers promptly
- Repair or replace broken down meters

- Improve general customer service (this could be done by training all NWCP staff who have contact with customers on customer service, relations and management).
- Increase the quantity of water and also pressure; this calls for additional investment in source-works (water production), transmission and distribution.

### **7.2.3 People living in Swahili houses**

NWCP is the main source of water to 40% of customers in this market segment. 44% of customers use kiosks as their main source of water while 14% use boreholes and wells. Some of the water sold through kiosks comes from NWCP. Boreholes and wells are the main competitors of NWCP in this market. Customers perceive borehole water to be of low quality low, and they use this source mainly because water supply by NWCP is insufficient. NWCP clearly has a competitive advantage in this market segment. Of those who receive water directly from NWCP, only 13% receive it continuously. These figures show that the main marketing strategy for NWCP is to increase water supply to customers while promoting the quality aspects of the water. In order for NWCP to utilise its competitive advantage in this market segment and improve its revenue position, it needs to improve water services.

In addition to the above measures the water utility (NWCP) should provide more water and construct improved kiosks at strategic locations in this market segment.

### **7.2.4 People living in informal settlements (slums)**

Most customers (94%) in this market segment do not have any water connections; NWCP directly serves only about 6% of customers in this segment. Competitor analyses show that kiosks are the main source of water for 70% of customers. The strategy here is for NWCP to ensure that all water sold through kiosks is billed for and payments made based on actual meter readings. Since 75% of customers are satisfied with drawing water from kiosks, NWCP should extend water pipelines and construct more kiosks at suitable locations in this market segment. 34% of customers who are not satisfied with services from kiosks cite inadequate quantity or pressure and 53% cite cost as the cause for their dissatisfaction. This means that if NWCP could construct more kiosks with a storage tank provided, more customers will be satisfied. An increase in the number of improved kiosks will result in a reduction of the cost of water to customers. The price of water per 20 litre container (currently an average of KSh3/10 during normal times and KSh5/80 during shortages), is likely to go down. With reduced prices, customers are more likely to use more water; thus NWCP can increase sales and hence obtain more revenue.

An important aspect in this market segment is for the utility to allow, and even promote on-selling of water. Those who have connections should be encouraged to sell to others. In this way, water consumption would increase (with easier access to water), and the total amount of water sold in this segment will increase. As the water is metered, the revenues revenue will increase from increased sale.

NWCPC should also promote the high quality of its water delivered through kiosks. Such promotion is likely to result in more sales as customers abandon low quality untreated water obtained from boreholes and wells in favour of piped water obtained from NWCPC. NWCPC has the potential to capture the 22% market share currently taken by boreholes and wells in this market segment.

As it is not cost effective for NWCPC to directly manage water kiosks, it is proposed to let private operators or community groups (where they exist) to manage kiosks on a franchise from NWCPC.

Marketing of water services in this market segment requires effective dialogue with people living in informal settlements. This can be done through focus group discussions involving all stakeholders. Social workers from the Municipal council have good working relationships with the community and are an important entry point. Communities living in informal settlements also have their leaders who are often influential and can be useful for the utility to work with. It is suggested that NWCPC should utilise these existing contacts and engage the community in meaningful dialogue at all stages of the project to improve water services in informal areas, and thereafter during the operational phase.

### **7.3 Improved Customer Relations/Satisfaction**

Apart from the technical function of supplying water to customers, NWCPC needs to interact with customers in the course of billing, revenue collection and other related activities. Due to the central role that water plays in peoples' daily lives, it is important that NWCPC communicates effectively with customers in a proactive way. As a start, NWCPC should deal with all customers in a courteous manner. Technology being what it is, it is inevitable that there will at times be interruptions in water supply or errors in billing. It is important for NWCPC to maintain an open channel of communication with customers at all times. Whenever interruptions in water supply occur, customers should be promptly advised.



An effective way of enabling NWCPCC to improve customer relations is to train all members of staff to be customer orientated. An organisation that is customer orientated places the customer above all else and considers the customer to be king and not a water consumer. All activities of the organisation are then centred on the customer. Changes in tariff should be preceded or accompanied by effective information flow between the utility and customers, with explanation given for the need to revise tariffs. Customers should be treated with respect whenever they contact or visit NWCPCC offices. All staff should answer customers' enquiries or queries promptly, accurately and fairly.

#### **7.4 Utility Institutional Improvements**

The SWOT analysis of NWCPCC revealed its strengths, weaknesses, opportunities and threats. Analysis of NWCPCC's financial performance and customers' perceptions show that NWCPCC is not meeting its objectives and there is considerable room for improvement. It is therefore imperative that NWCPCC develops a strategy to correct its weaknesses. Such a strategy has the potential to enable NWCPCC to use its strengths and to take advantage of its numerous opportunities in order to achieve its stated objectives.

NWCPCC was set up with the intention that it would provide water services in an efficient manner and on commercial basis. These intentions are well stipulated in the legislation establishing NWCPCC. It is therefore crucial that the institution's structure reflects the stated objectives and for all staff to be commercially orientated. Staff who may still harbour public service attitudes should be identified and trained in commercial methods of water service delivery. A thorough audit of staff with details of the skills they possess should be undertaken to serve as the basis of human resources development. There is a clear need for change in the organisational culture, to reflect current realities in the sector.

A suitable management structure with clear lines of authority should be followed with the Board of Directors giving the Managing Director a free hand to manage the corporation and meet the stated objectives without undue interference. Key tasks should be identified and allocated to suitably qualified and skilled staff. Where necessary, skills that are found lacking among existing staff should be procured from outside the utility. Appropriate delegation of authority and responsibility should be undertaken with necessary support, from top management to senior and middle management. Staff should be remunerated according to current market rates for commercially orientated organisations. In return, specific and measurable targets should be negotiated with all staff, and attainment of these targets should then be the yardstick for assessing staff performance, and supporting the staff as appropriate.

NWCPC should identify the core activities that must be carried out in-house by suitably skilled staff. Non-core activities or tasks that are more cost effectively and efficiently carried out by specialised firms should be contracted out to suitable private operators. Contracting out of services should be done competitively in an open and transparent manner in order to reap full benefits of private sector participation.

## **7.5 Partnerships with Other Stakeholders**

A useful approach for the utility is to engage in partnerships with other stakeholders. Such stakeholders include community groups, co-operatives, religious groups, NGOs and the small-scale water providers. These partnerships have the potential to create additional viable management options, where the utility provides water in bulk for distribution by the stakeholders. Through appropriate partnerships, water can be extended to areas where the utility may find difficult to operate. By using appropriate tariff structure, the utility can meet its equity objectives of supplying water to all while recovering the costs of provision. In some instances, stakeholders can often manage water services at less cost than the utility, and this is additional incentive for the utility to forge viable partnerships.

## **8. Evaluation of Benefits and Risks**

### **8.1 Benefits**

The improvements proposed in this strategic marketing plan have potential to result in major benefits for NWCPC, its customers and other stakeholders. Improvements in water services to customers living in all market segments will enhance equity as all customers could benefit from improved health, convenience and general well-being. With all customers receiving improved water services, their willingness to pay and sustain payments will increase, and this could result in improved cash-flow for NWCPC. NWCPC's financial sustainability is likely to improve with the increase in its revenue base.

A financially healthy Mombasa and coast region is good news for other regions of NWCPC and the rest of the country. This is because any profits from Mombasa could contribute to improvements of water services in other areas as provided for in NWCPC's mandate. A financially healthy NWCPC is also good for the government since the exchequer would not need to finance the operations of NWCPC. This saving could be used in other sectors of the economy for the good of the country.

Availability of reasonably priced water supply is an important input for industry (especially tourism) and commerce. Mombasa is an important seaport that serves not only Kenya but also other eastern and central African countries such as Uganda, Rwanda, Burundi, and the Democratic Republic of Congo. Mombasa's strategic location as a seaport and a favourite holiday destination makes it important for Kenya's economy. In recent years, the economic growth of Mombasa has been adversely affected by the frequent water shortages. Improvements in water services will therefore contribute to the economic growth of Mombasa and the coastal area and benefit the entire country.

### **8.2 Risks**

All human activities are prone to risks, and this includes implementation of projects. The risks inherent in the implementation of this strategic marketing plan include the following:

- Management risks (such as staff resistance to proposed changes)
- Financing risks,
- Construction risks
- Political risks
- Environmental risks

During implementation of the SMP, specific risks should be identified and allocated to the party best able to manage them. The most significant risks are likely to be management risks. Success of the SMP therefore largely depends on suitably motivated top management who can articulate the benefits to be realised from implementation of the SMP and win the support and confidence of the Board of Directors. The Board of Directors can successfully manage the political risks. With support by the Board of Directors, the top management can successfully carry out the necessary management improvements, seek long term finance from lenders to finance bulk supply and distribution network improvement project, and successfully implement the project.

### **8.3 How can NWCP Ensure Success?**

This strategic marketing plan was prepared using commercial marketing approach to management of water services. Marketing principles have been successfully applied and used widely in different sectors, and it has been argued that they can be applied in the urban water sector with good results. It is therefore suggested that NWCP should consider the ideas in this SMP and implement with changes where appropriate.

Upon implementation of the SMP, an efficient monitoring system with a feed back mechanism should be adopted to ensure continued benefits. The lessons learnt in Mombasa and the coastal area can be used to adapt the strategy and implement SMP's in other regions of NWCP. It is expected that this approach has the potential to improve water services in all regions of NWCP.

## 9. ANNEXES

### 9.1 Summary of water production for Mombasa and the coastal area

**Table 25. Water production for Mombasa and the coastal area.**

Bulk Water Supply	Capacity (m <sup>3</sup> /day)	Current Production (m <sup>3</sup> /day)
Baricho (Sabaki) Water Works	72,000	47,000
Mzima Pipeline	35,000	35,000
Marere Pipeline	12,000	7,000
Tiwi Boreholes	6,000	4,000
Taveta Lumi	1,200	1,000
Total	126,200	94,000

Source: NWCP's database and verified by the author

Current annual water production = 94000 x 365 = 34,310,000 m<sup>3</sup>/year

### 9.2 Existing (1999/2000) tariffs in Mombasa and the Coastal area

**Table 26. Current tariff in Mombasa**

Consumption (m <sup>3</sup> /month)	Rate (KSh/m <sup>3</sup> )
No meter installed (Flat rate charge)	200.00 (per month)
0-10	20.00
11-20	25.00
21-50	30.00
51-100	45.00
101-300	75.00
>300	100.00
Water sold through a meter at a kiosk per unit of 20 litres or part thereof, charge per cubic metre (Bulk Water Purchase from NWCP)	15.00
Water sold by retail at a kiosk per unit of 20 litres or part thereof, charge per unit (Water Sales to customers)	2.00 per 20 litres
Bulk Sales to a water undertaker for resale, charge per cubic metre	15.00

Source: Adapted from Kenya Subsidiary Legislation, 1999. (New tariffs that took effect in November 1999)

### 9.3 Calculations for performance indicators

The billing for Mombasa and Coast Region (average for July to December 1998) is:

Average water sold in	=1,864,093 m <sup>3</sup> per Month
Average water sold (monthly billing)	=KSh56,655,193 per Month
Current annual water sold (billing)	=KSh679 862 316/year
Annual water sold	=1,864,093x12=22,369,116m <sup>3</sup> /year
Current average tariff	=KSh679 862 316/22 369 116m <sup>3</sup> =KSh30.40 per m <sup>3</sup>
Unaccounted for water	= (water produced-water sold)/(water produced) =(34,310,000-22,369,116)/(34,310,000) =0.348 =35%

Summary of revenue collection in Mombasa and Coastal Region (average for July to December 1998) is:

Average revenue collection	=KSh38 570 117 per Month
Average water sold (billing)	=KSh56 655 193 per Month
Bill collection efficiency	=(average revenue collection)/(average billing) =38,570,117/56,655,193 =0.6807 =68%
Outstanding arrears (cumulative since 1989)	795,404,683 (includes disputed bills)

The average revenue collected per unit volume of water sold is 38,570,117/1,864,093 = KSh20.70 (US\$0.30)/m<sup>3</sup>.

This is effectively the current average tariff as it takes into account operating management efficiency.

Current volume of water sold per annum	=22,369,116m <sup>3</sup> /year
Current annual billing (potential revenue)	=KSh679 862 316/year
Current average annual revenue (actual revenue collected) (Before implementation of the 1999 tariff)	=KSh462 841 404
Current average tariff (based on actual revenue collected)	=KSh21/m <sup>3</sup>
Current bill collection efficiency	=68%
Current unaccounted for water (UFW)	=35%

Water connections (for Mombasa and coast region)

Number of connections	59,330
Number of working meters	47,449 (80%)
Number of non-working meters	11,881 (20%)

STAFF

Total number of staff in Coast Region	596 (460 permanent and 136 temporary employees)
Number of employees per 1000 connections	10
Average number of people per connection	$=1500000/50000$ $=30$

*Current water consumption per category*

There are presently three categories of customers with estimated consumption as follows:

Residential (individual connections or yard connections)	$=14,092,543 \text{ m}^3$ (63%)
Kiosks or public	$=1,565,838$ (7%)
Industrial	$=6,710,735$ (30%)
Average total amount sold per year	$=22,369,116 \text{ m}^3$ per year

Some institutional customers such as hotels are included in the category of residential customers. Due to current water shortages, many customers use alternative sources of water. Many industrial, commercial and institutional customers have invested in alternative sources such as boreholes and wells.

Assuming that 70% of the water sold is currently used for domestic consumption by a population of about 1,500,000 in Mombasa and coastal area, the current average per capita consumption is about  $(22,369,116 \times 70 / 100) / (365 \times 1,500,000) = 29$  litres per capita per day.

1997/1998 financial year

Billing for the 1997/1998 financial year	$=\text{KSh}405,742,032$
Revenue collection for the 1997/1998 financial year	$=\text{KSh}356,823,793$
Bill collection efficiency	$= 356,823,793 / 405,742,032$ $=88\%$

1998/1999 financial year

Billing for the 1998/1999 financial year =KSh677 695 470

Revenue collection for the 1998/1999 financial year =KSh430,328,755

Bill collection efficiency =  $430,328,755 / 677\ 695\ 470$   
=64%

1999/2000 financial year

Billing for the 1999/2000 financial year =KSh732 179 338

Revenue collection for the 1999/2000 financial year =KSh566 805 552

Bill collection efficiency =  $566\ 805\ 552 / 732\ 179\ 338$   
=77%

Average bill collection efficiency =  $(88+64+77) / 3 = 76\%$

**Table 27. Summary of financial ratios (for NWCP Coast Region)**

	1997/98 (KSh)	1998/99 (KSh)	(**)1999 / 2000	Average (KSh)
Water Revenue Billing	405,742,032	677,695,470	732,179,338	Increasing
Water Revenue Collection	356,823,793	430,328,755	566,805,552	Increasing
Bill collection efficiency	88%	64%	77%	76%
(*)Recurrent Expenditure	153,928,925	201,197,356	197,775,828	43,124,916
Ratio (Expenditure/ Collections)	43%	47%	35%	42%

\*Recurrent expenditure does not include loan repayments and depreciation.

Source: Adapted from NWCP audited financial accounts, calculations by the author.

Although recurrent expenditure shown in the above table does not include loan repayments and depreciation, it is likely that NWCP Mombasa is able to balance its books and achieve financial sustainability.



1999 / 2000 data (This data is suspected to have errors due to billing system failure)

Volume of water sold per annum	=18,522,444m <sup>3</sup> /year
Annual billing (potential revenue)	=KSh732,179,338/year
Average annual revenue (actual revenue collected)	=KSh566,805,552/year
(includes billing before implementation of the 1999 tariff)	
Current average tariff (based on actual revenue collected)	=KSh21/m <sup>3</sup> (aboutUS\$0.30/m <sup>3</sup> )
Bill collection efficiency	=77%
Unaccounted for water (UFW)	=46%

## 9.4 Calculations for Average Incremental Cost (AIC)

SCENARIO 1: AIC CALCULATION BASED ON FULL COSTS OF IMPROVEMENTS AND ENTIRE CAPACITY OF WATER DISTRIBUTION NETWORK CONTRIBUTING TO NEW INVESTMENT WITH HIGH EFFICIENCY.

Scenario 1 assumes that financing will be available to finance bulk supply and improvements to the distribution network. The total capital cost for both components is US\$285 million. Provision for rehabilitation of the system is made at US\$10 million. It is assumed that this amount will be spent in the 10<sup>th</sup> year after commissioning. It is assumed that the full costs of improving the water supply system will be met from water sales from the entire region. A high level of management efficiency is assumed at 15% unaccounted for water (UFW) and 90% bill collection efficiency.

The following further assumptions are made:

- Financing is secured at 8% per annum with a grace period equal to the construction period so that repayments commence after commissioning when water is sold to customers.
- Unaccounted for water is 15% so that 85% of water produced is sold (billed for).
- Revenue collection efficiency of the water utility is 90% (with commercial management). This means that 90% of the water sold is actually paid for.
- Management of the distribution system will be on commercial basis (The estimated costs assume that commercial management would be engaged).
- The life of the project is assumed to be only 25 years for purposes of calculation of AIC: It is known that such projects have a much longer life span. (The existing First Mzima Pipeline project is over 45 years and still performing well while Sabaki Transmission Pipeline is over 20 years)

The operation and maintenance cost for Sabaki (Baricho) water source has been estimated at US\$0.59 per m<sup>3</sup>. Assuming that Marere and Tiwi maintain production at their full capacities of 12,000 and 6,000 respectively and that Baricho source maintains its present contribution of 72,000 m<sup>3</sup>/day, then the total amount distributed by the strengthened network is 86,400+12,000+6,000+72,000 = 176,400 m<sup>3</sup>.

Total Capital Cost of the second Mzima pipeline, storage, & distribution	US\$285,000,000
Annual O & M cost (Mzima bulk supply, 86400m <sup>3</sup> /day)	US\$2,000,000/yr
Annual O & M cost (Baricho & Tiwi bulk sources, 78,000@US\$0.59)	US\$16,797,000/yr
Annual O & M costs (distribution system with commercial management)	US\$8,000,000/yr
Total operation and maintenance costs	US\$26,797,000/yr
Annual water produced 176,400m <sup>3</sup> /day	64,386,000m <sup>3</sup> /yr
Annual water sold (@15%UFW)	54,730,000m <sup>3</sup> /yr
Annual water sold and paid for (@90% bill collection efficiency)	49,260,000m <sup>3</sup> /yr
Discount Rate	8%

With these assumptions, the average incremental cost for the 2<sup>nd</sup> Mzima water supply project for Mombasa is calculated as shown below.

**Table 28. SCENARIO 1: AIC Calculation for 2<sup>nd</sup> Mzima Water supply Project (Bulk supply, distribution network and commercial management of system, high efficiency at 15% UFW)**

Year	Capital Costs in '000 US\$	Operation and Maintenance Costs in '000 US\$	Total Costs in '000 US\$	Discount Factor at 8% Discount Rate	Present Value of Total Costs in '000 US\$	Water sold and paid for in '000 m <sup>3</sup> /yr	Present Value of Water sold and paid for in '000 m <sup>3</sup> /yr
1	285,000	16,797	301,797	0.926	279,464	25,000	23,150
2		26,797	26,797	0.857	22,965	49,260	42,216
3		26,797	26,797	0.794	21,277	49,260	39,112
4		26,797	26,797	0.735	19,696	49,260	36,206
5		26,797	26,797	0.681	18,249	49,260	33,546
6		26,797	26,797	0.630	16,882	49,260	31,034
7		26,797	26,797	0.583	15,623	49,260	28,719
8		26,797	26,797	0.540	14,470	49,260	26,600
9		26,797	26,797	0.500	13,399	49,260	24,630
10	10,000	26,797	36,797	0.463	17,037	49,260	22,807
11		26,797	26,797	0.429	11,496	49,260	21,133
12		26,797	26,797	0.397	10,638	49,260	19,556
13		26,797	26,797	0.368	9,861	49,260	18,128
14		26,797	26,797	0.340	9,111	49,260	16,748
15		26,797	26,797	0.315	8,441	49,260	15,517
16		26,797	26,797	0.292	7,825	49,260	14,384
17		26,797	26,797	0.270	7,235	49,260	13,300
18		26,797	26,797	0.250	6,699	49,260	12,315
19		26,797	26,797	0.232	6,217	49,260	11,428
20		26,797	26,797	0.215	5,761	49,260	10,591
21		26,797	26,797	0.199	5,333	49,260	9,803
22		26,797	26,797	0.184	4,931	49,260	9,064
23		26,797	26,797	0.170	4,556	49,260	8,374
24		26,797	26,797	0.158	4,234	49,260	7,783
25		26,797	26,797	0.146	3,912	49,260	7,192
				TOTAL PRESENT COSTS	545,312	TOTAL PRESENT VALUE OF WATER SOLD AND PAID FOR	503,336

Average Incremental Cost = (Present =US\$545,312,000/503,336,000m<sup>3</sup>

Value of Total Costs) / (Present Value =US\$1.08per m<sup>3</sup>  
of water sold and paid for)

In this scenario, the average incremental cost of water is US\$1.08 per m<sup>3</sup>.  
With the present exchange rate of KSh73/ = to the US\$, the Average  
Incremental Cost is about Ksh78.85/= per m<sup>3</sup>

In order to break even, the average tariff would be set at US\$1.08 per m<sup>3</sup>.

**SCENARIO 2: AIC CALCULATION BASED ON FULL COSTS OF  
IMPROVEMENTS AND ENTIRE CAPACITY OF WATER DISTRIBUTION  
NETWORK CONTRIBUTING TO NEW INVESTMENT, AT MODEST  
EFFICIENCY**

Scenario 2 is similar to scenario 1 above but at a lower level of management  
efficiency. In this scenario, the AIC is calculated assuming that UFW is 20%  
and bill collection efficiency is 85%.

Total Capital Cost of the second Mzima pipeline, storage, & distribution	US\$285,000,000
Annual O & M cost (Mzima bulk supply, 86400m <sup>3</sup> /day)	US\$2,000,000/yr
Annual O & M cost (Baricho & Tiwi bulk sources, 78,000@US\$0.59)	US\$16,797,000/yr
Annual O & M costs (distribution system with private sector management)	US\$8,000,000/yr
Total operation and maintenance costs	US\$26,797,000/yr
Annual water produced 176,400m <sup>3</sup> /day	64,386,000m <sup>3</sup> /yr
Annual water sold (@20%UFW)	51,510,000m <sup>3</sup> /yr
Annual water sold and paid for (@85% bill collection efficiency)	43,800,000m <sup>3</sup> /yr
Discount Rate	8%

With these assumptions, the average incremental cost for the 2<sup>nd</sup> Mzima  
water supply project for Mombasa is calculated as shown below.

**Table 29. SCENARIO 2: AIC Calculation for 2<sup>nd</sup> Mzima water supply project (bulk supply, distribution network and commercial management of the system) with modest efficiency at UFW 20%**

Year	Capital Costs in '000 US\$	Operation and Maintenance Costs in '000 US\$	Total Costs in '000 US\$	Discount Factor at 8% Discount Rate	Present Value of Total Costs in '000 US\$	Water sold and paid for in '000m <sup>3</sup> /yr	Present Value of Water sold and paid for in '000m <sup>3</sup> /yr
1	285,000	16,797	301,797	0.926	279,464	24,000	22,224
2		26,797	26,797	0.857	22,965	43,800	37,537
3		26,797	26,797	0.794	21,277	43,800	34,777
4		26,797	26,797	0.735	19,696	43,800	32,193
5		26,797	26,797	0.681	18,249	43,800	29,828
6		26,797	26,797	0.630	16,882	43,800	27,594
7		26,797	26,797	0.583	15,623	43,800	25,535
8		26,797	26,797	0.540	14,470	43,800	23,652
9		26,797	26,797	0.500	13,399	43,800	21,900
10	10,000	26,797	36,797	0.463	17,037	43,800	20,279
11		26,797	26,797	0.429	11,496	43,800	18,790
12		26,797	26,797	0.397	10,638	43,800	17,389
13		26,797	26,797	0.368	9,861	43,800	16,118
14		26,797	26,797	0.340	9,111	43,800	14,892
15		26,797	26,797	0.315	8,441	43,800	13,797
16		26,797	26,797	0.292	7,825	43,800	12,790
17		26,797	26,797	0.270	7,235	43,800	11,826
18		26,797	26,797	0.250	6,699	43,800	10,950
19		26,797	26,797	0.232	6,217	43,800	10,162
20		26,797	26,797	0.215	5,761	43,800	9,417
21		26,797	26,797	0.199	5,333	43,800	8,716
22		26,797	26,797	0.184	4,931	43,800	8,059
23		26,797	26,797	0.170	4,556	43,800	7,446
24		26,797	26,797	0.158	4,234	43,800	6,920
25		26,797	26,797	0.146	3,912	43,800	6,395
				TOTAL PRESENT COSTS	545,312	TOTAL PRESENT VALUE OF WATER SOLD AND PAID FOR	449,186

Average Incremental Cost = (Present =US\$545,312,000/449,186,000m<sup>3</sup>

Value of Total Costs) / (Present Value =US\$1.21 per m<sup>3</sup>  
of water sold and paid for)

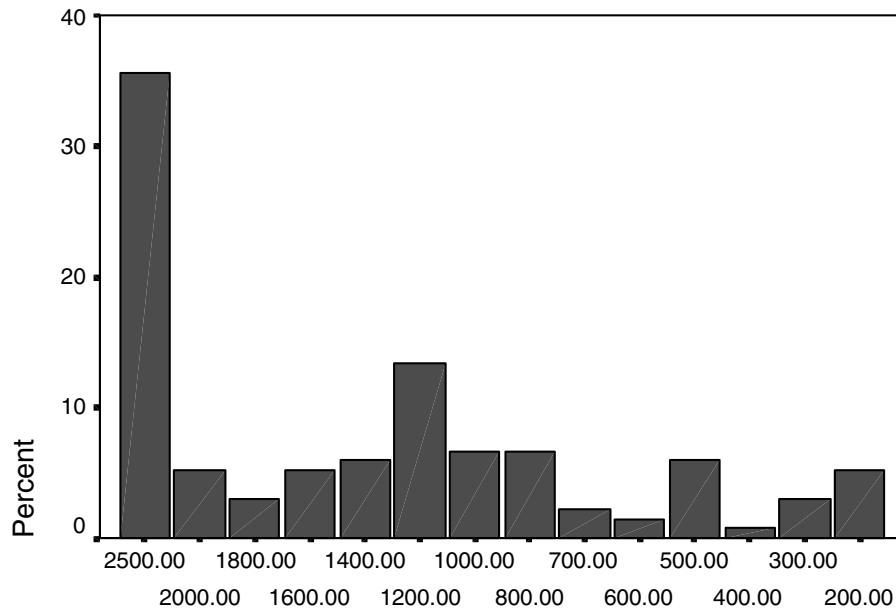
In this scenario, the average incremental cost of water is US\$1.21 per m<sup>3</sup>.  
With the present exchange rate of KSh73/= to the US\$, the Average  
Incremental Cost is about Ksh88.30/= per m<sup>3</sup>

## 9.5 Willingness to pay for respective service options

### 9.5.1 WTP for Service level 1: Continuous water supply to an individual house connection in a planned area with bungalows, maisonettes or flats

This was the highest level of service offered to residents living in bungalows, maisonettes or flats in planned areas. 36% of respondents are willing to pay the first bid amount of KSh2500/= per month. 75% of respondents are willing to pay KSh1000/= per month or more while 68% are willing to pay KSh1200/= per month or more for this service. The weighted mean willingness to pay for this service level is KSh1569/= per month. 50% of respondents are willing to pay the weighted mean or more. The full results are illustrated in the bar chart below (Figure 11). There is high demand for this service level as demonstrated by high willingness to pay.

Figure 11. WTP (KSh): Service Level 1

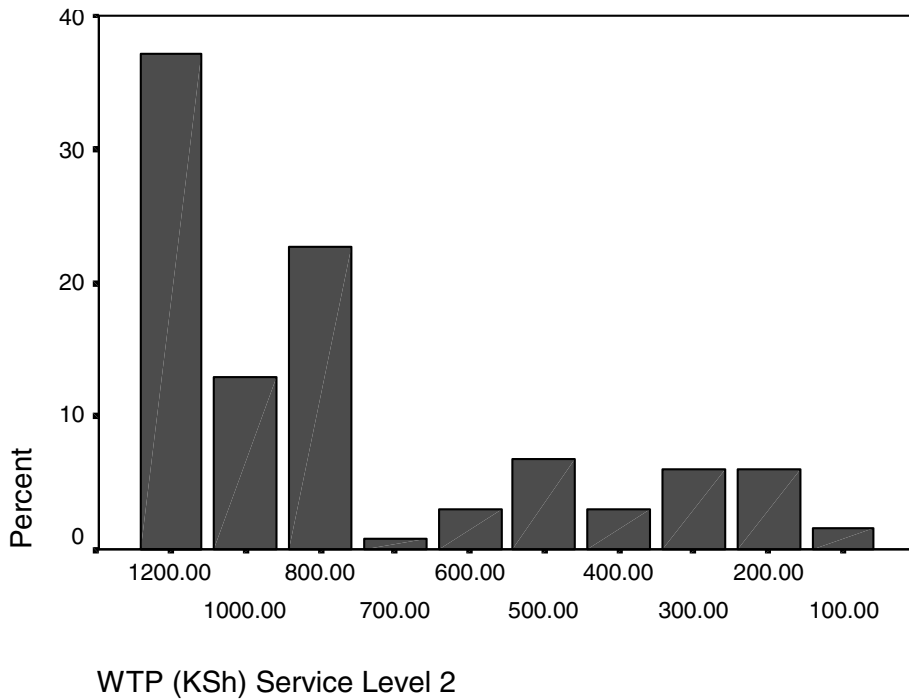


WTP (KSh) Service Level 1

**9.5.2 WTP for Service level 2: 12-Hour water supply to an individual house connection in a planned area with bungalows, maisonettes or flats**

37% of respondents are willing to pay the first bid amount of KSh1200/= per month. 73% of respondents are willing to pay KSh800/= per month or more while 50% are willing to pay KSh1000/= per month or more for this service. The weighted mean willingness to pay for this service level is KSh858/= per month. 66% of respondents are willing to pay the weighted mean or more. The full results are illustrated in Figure 12.

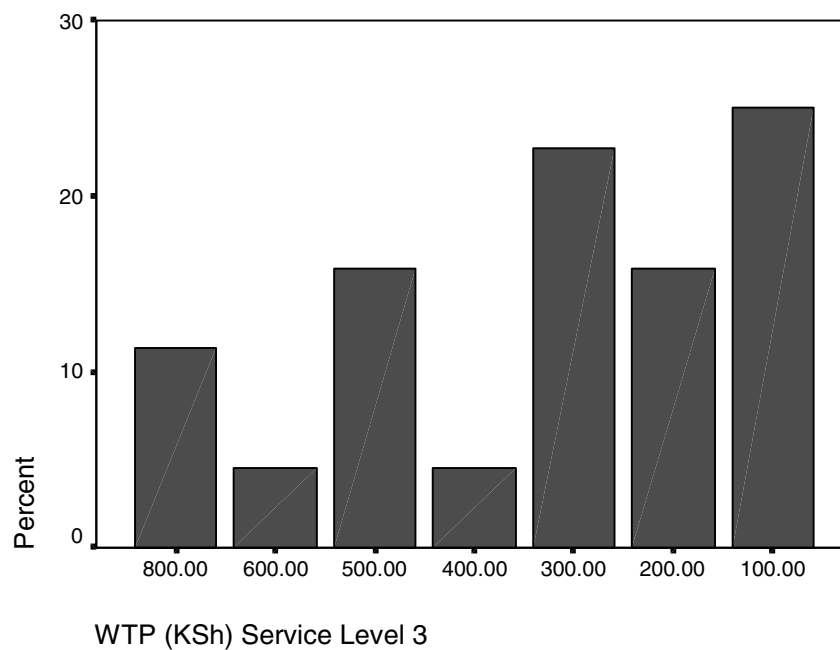
**Figure 12. WTP (KSh): Service Level 2**



**9.5.3 WTP for Service level 3: 4-Hour water supply to an individual house connection in a planned area with bungalows, maisonettes or flats**

Only 11% of respondents are willing to pay the first bid amount of KSh800/= per month. 75% of respondents are willing to pay a meagre over KSh200/= per month for this service. The weighted mean willingness to pay for this service level is only KSh341/= per month. 50% of respondents are willing to pay the weighted mean. This service level is not popular and there is hardly any demand for it. The full results are illustrated in the bar chart below (Figure 13).

**Figure 13. WTP (KSh): Service Level 3**

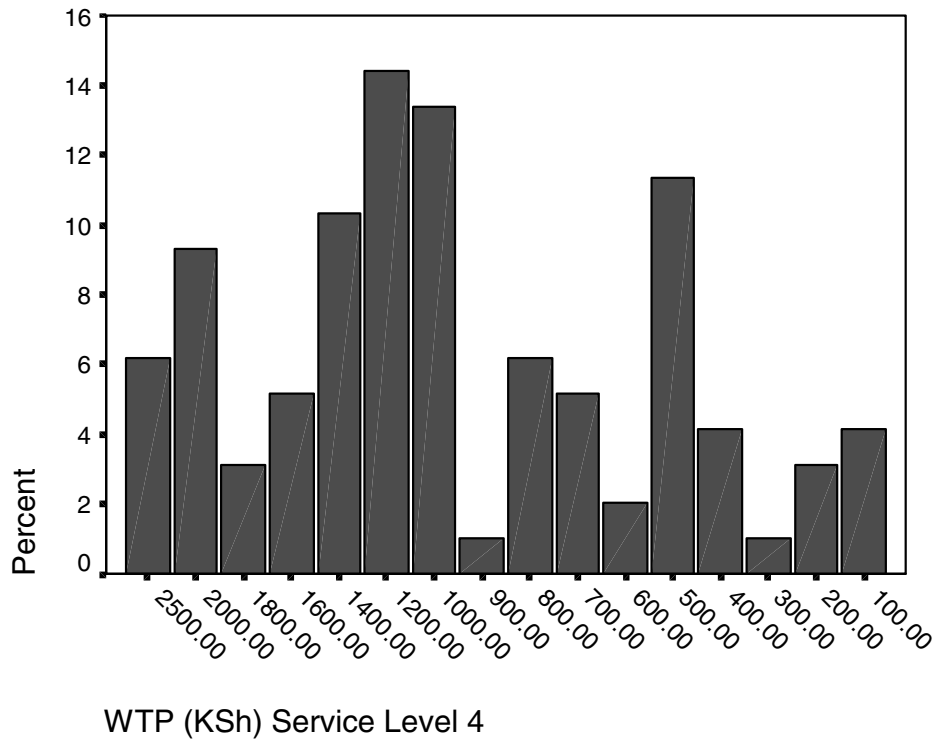




**9.5.4 WTP for Service Level 4: Continuous water supply to a shared yard connection in a planned area with 1, 2 or 3 roomed dwellings or Swahili houses**

6% of respondents are willing to pay the first bid amount of KSh2500/= per month. 74% of respondents are willing to pay over KSh700/= per month for this service. The weighted mean willingness to pay for this service level is KSh1124/= per month. 54% of respondents are willing to pay the weighted mean. The full results are illustrated in Figure 14.

**Figure 14. WTP (KSh): Service Level 4**

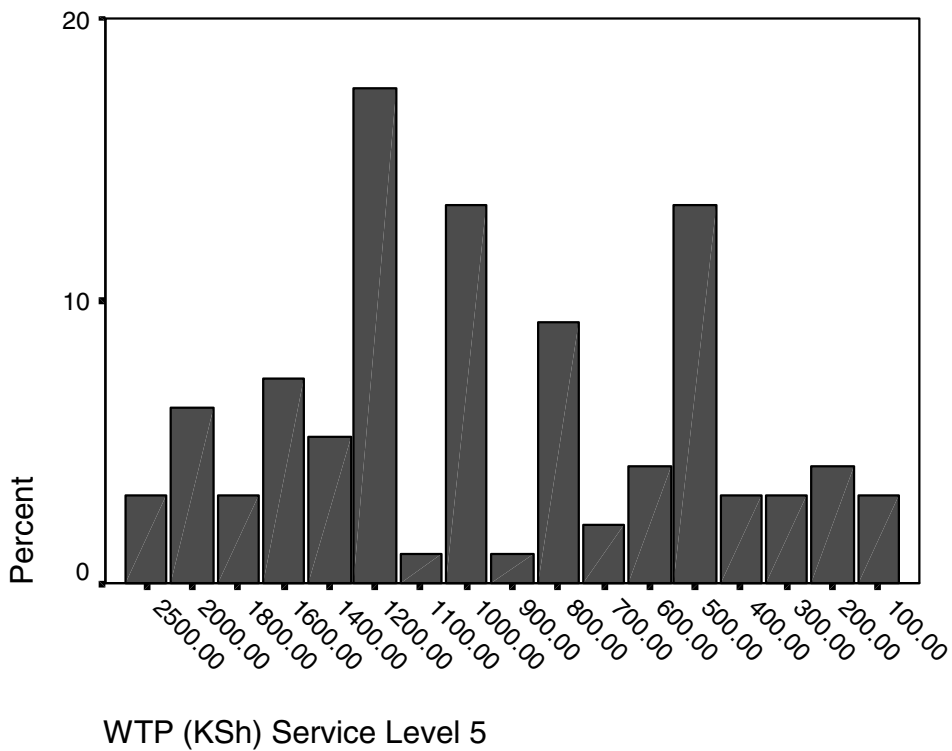


The table shows high demand for this service level.

**9.5.5 WTP for Service Level 5: Continuous water supply to a shared yard connection with storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili houses**

3% of respondents are willing to pay the first bid amount of KSh2500/= per month. 73% of respondents are willing to pay over KSh600/= per month for this service. The weighted mean willingness to pay for this service level is KSh1023/= per month. 53% of respondents are willing to pay the weighted mean. The full results are illustrated in the bar chart below (Figure 15).

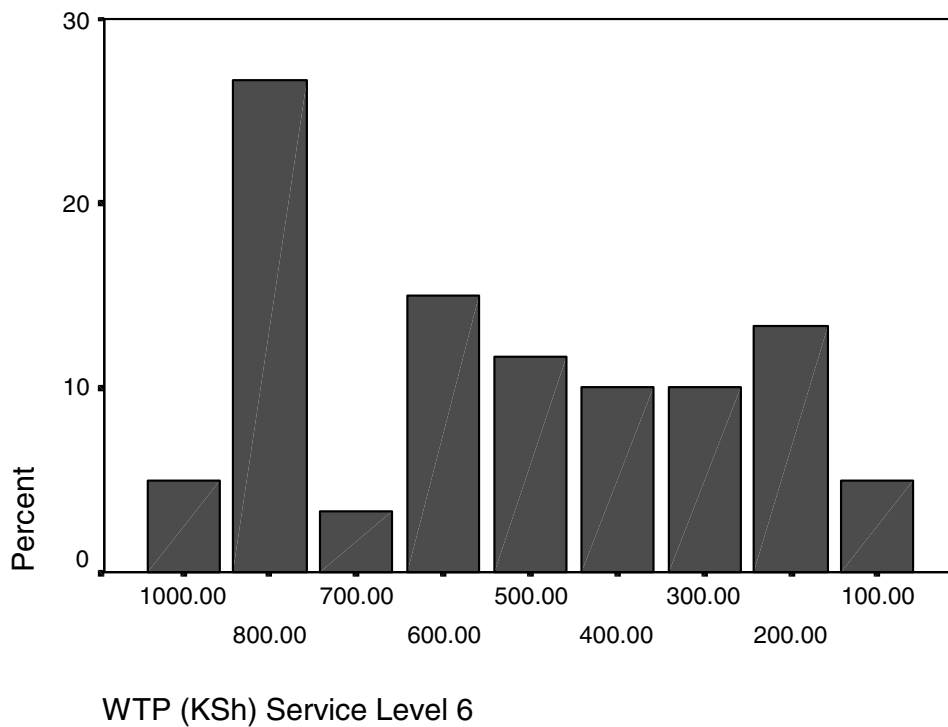
**Figure 15. WTP (KSh): Service Level 5**



**9.5.6 WTP for Service Level 6: 12-Hour water supply to a shared yard connection without storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses**

5% of respondents are willing to pay the highest bid amount of KSh1000/= per month. 72% of respondents are willing to pay over KSh400/= per month for this service. The weighted mean willingness to pay for this service level is KSh537/= per month. 57% of respondents are willing to pay the weighted mean. The full results are illustrated in bar chart below (Figure 16).

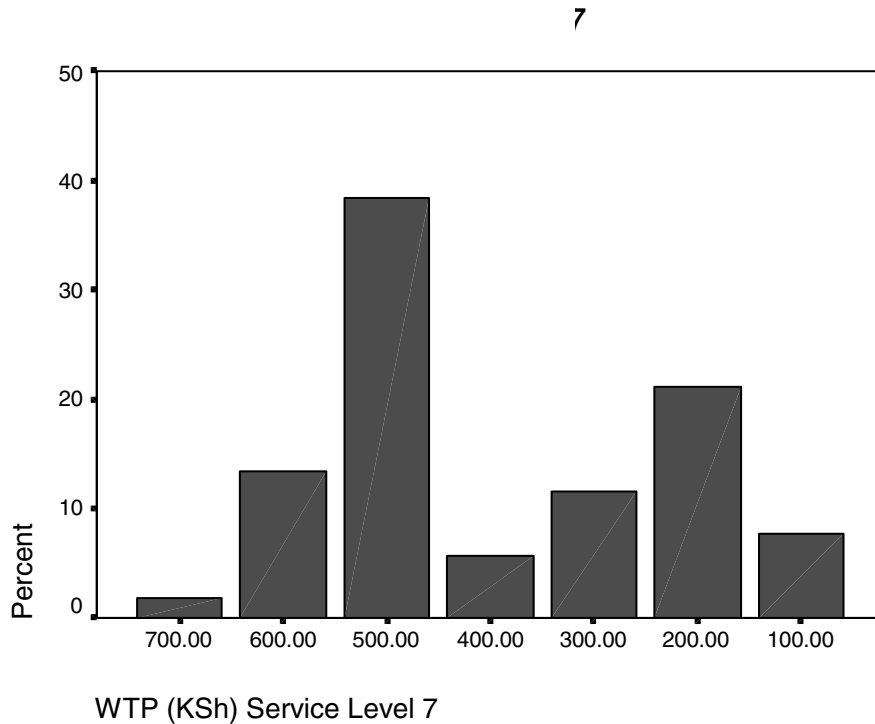
**Figure 16. WTP (KSh): Service Level 6**



**9.5.7 WTP for Service Level 7: 4-Hour water supply to a shared yard connection without storage tank in a planned area with 1, 2 or 3 roomed dwellings or Swahili Houses**

2% of respondents are willing to pay the highest bid amount of KSh700/= per month. 71% of respondents are willing to pay KSh300/= or more per month for this service. The weighted mean willingness to pay for this service level is KSh395/= per month. 60% of respondents are willing to pay the weighted mean or more. The full results are illustrated in Figure 17.

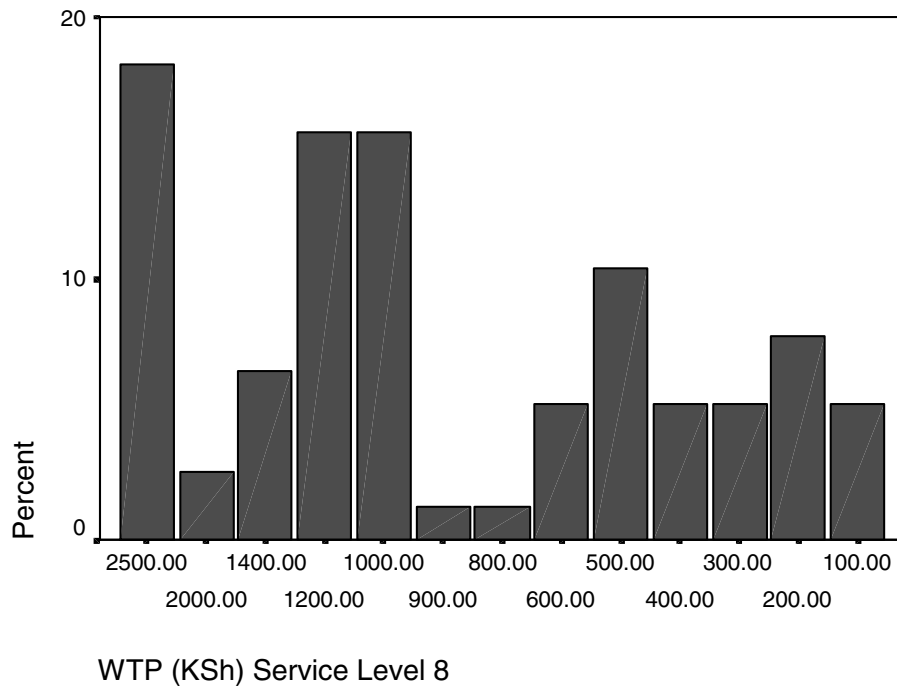
**Figure 17. WTP (KSh): Service Level 7**



**9.5.8 WTP for Service level 8: Continuous water supply to a shared yard connection with storage tank in an informal settlement**

18% of respondents are willing to pay the highest bid amount of KSh2500/= per month. 77% of respondents are willing to pay KSh500/= per month or more for this service. The weighted mean willingness to pay for this service level is KSh1103/= per month. 51% of respondents are willing to pay the weighted mean or more. The full results are illustrated in Figure 18.

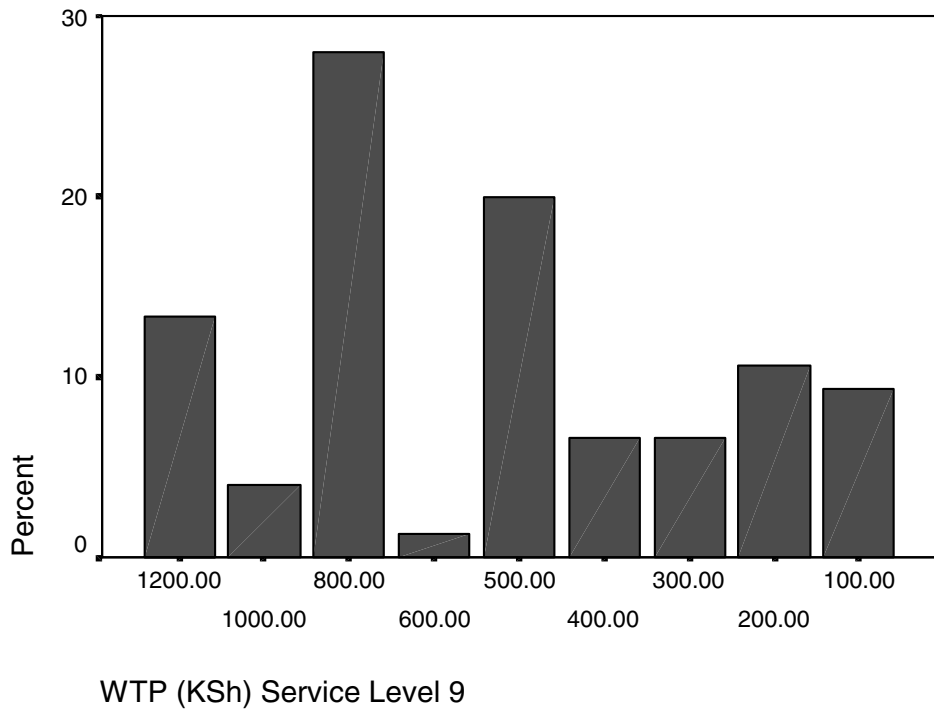
**Figure 18. WTP (KSh): Service Level 8**



**9.5.9 WTP for Service Level 9: 12-Hour supply to a shared yard connection in an informal settlement without tank**

13% of respondents are willing to pay the highest bid amount of KSh1200/= per month. 73% of respondents are willing to pay over KSh400/= per month while 67% are willing to pay over KSh500/= per month for this service. The weighted mean willingness to pay for this service level is KSh610/= per month. 47% of respondents are willing to pay the weighted mean. The full results are illustrated in Figure 19.

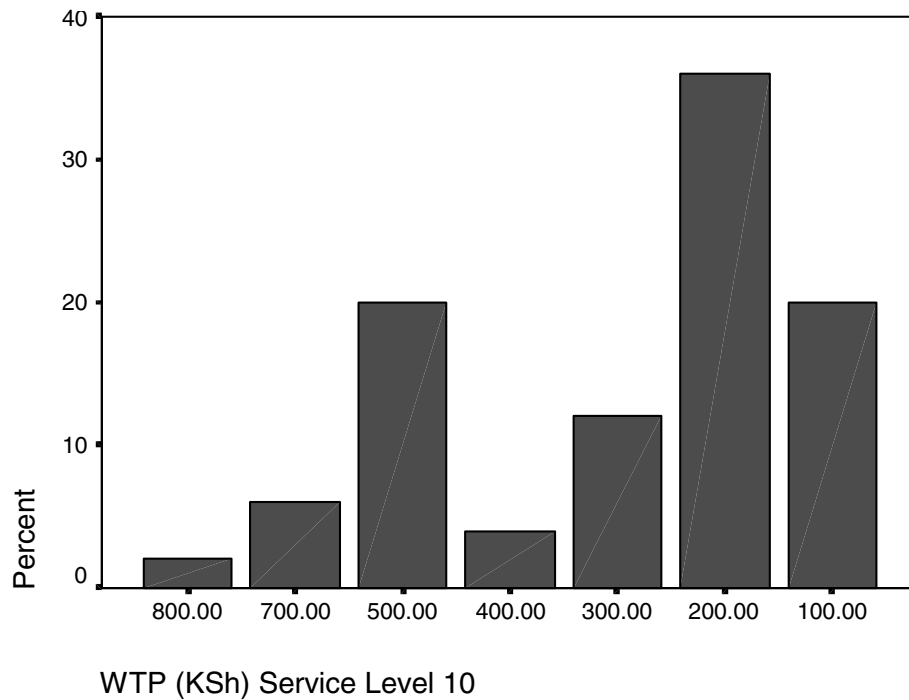
**Figure 19. WTP (KSh): Service Level 9**



**9.5.10 WTP for Service Level 10: 4-Hour supply to a shared yard connection in an informal settlement without tank**

13% of respondents are willing to pay the highest bid amount of KSh1200/= per month. Only 44% of respondents are willing to pay over KSh300/= per month while 80% are willing to pay over KSh200/= per month for this service. The weighted mean willingness to pay for this service level is KSh302/= per month. 44% of respondents are willing to pay the weighted mean. The full results are illustrated in the bar chart below (Figure 20).

**Figure 20. WTP (KSh): Service Level 10**

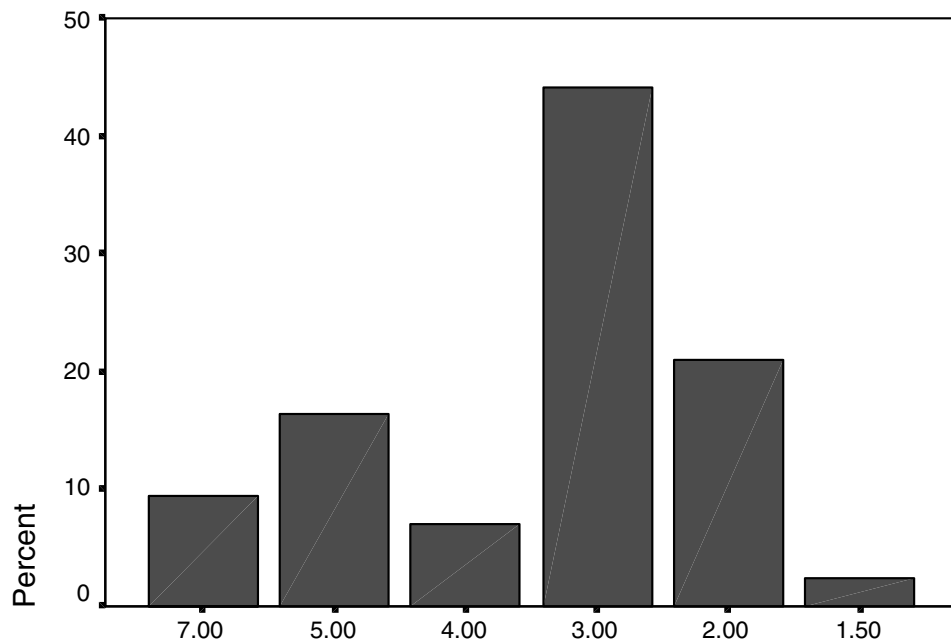


There is hardly any demand for this level of service as the willingness to pay is very low.

**9.5.11 WTP for Service level 11: Privately managed water kiosk with shelter and storage tank in an informal settlement**

9% of respondents are willing to pay the highest bid amount of KSh7/= per 20-litre container of water. 77% of respondents are willing to pay KSh3/= or more per 20-litre container of water while 33% are willing to pay over KSh4/= or more per 20-litre container. The weighted mean willingness to pay for this service level is KSh3/50 per 20-litre container of water. 55% of respondents are willing to pay the weighted mean. The full results are illustrated in Figure 21.

**Figure 21. WTP (KSh): Service Level 11**



WTP (KSh) Service Level 11

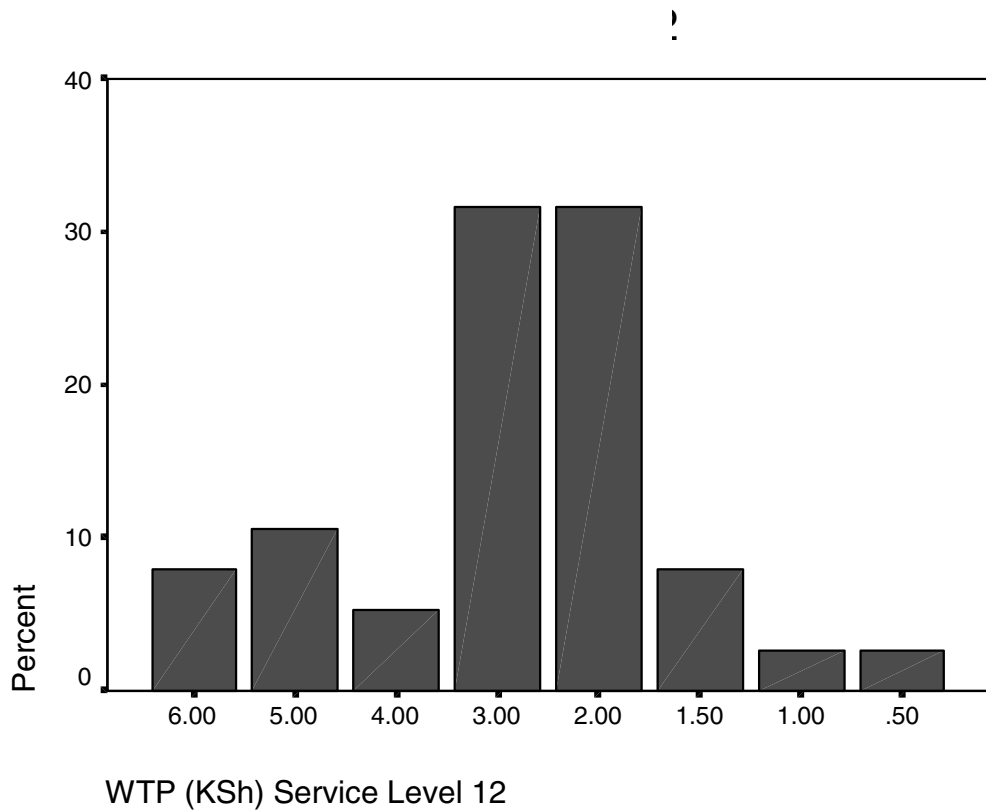
There is high demand for privately managed improved water kiosks as demonstrated by a high willingness to pay for this service level



**9.5.12 WTP for Service level 12: Community managed water kiosk with shelter and storage tank in an informal settlement**

8% of respondents are willing to pay the highest bid amount of KSh6/= per 20-litre container of water. 87% of respondents are willing to pay KSh2/= or more per 20-litre container of water month while 55% are willing to pay KSh3/= or more per 20-litre container. The weighted mean willingness to pay for this service level is KSh3/= per 20-litre container of water. 55% of respondents are willing to pay the weighted mean. The full results are illustrated in Figure 22.

**Figure 22. WTP (KSh): Service Level 12**

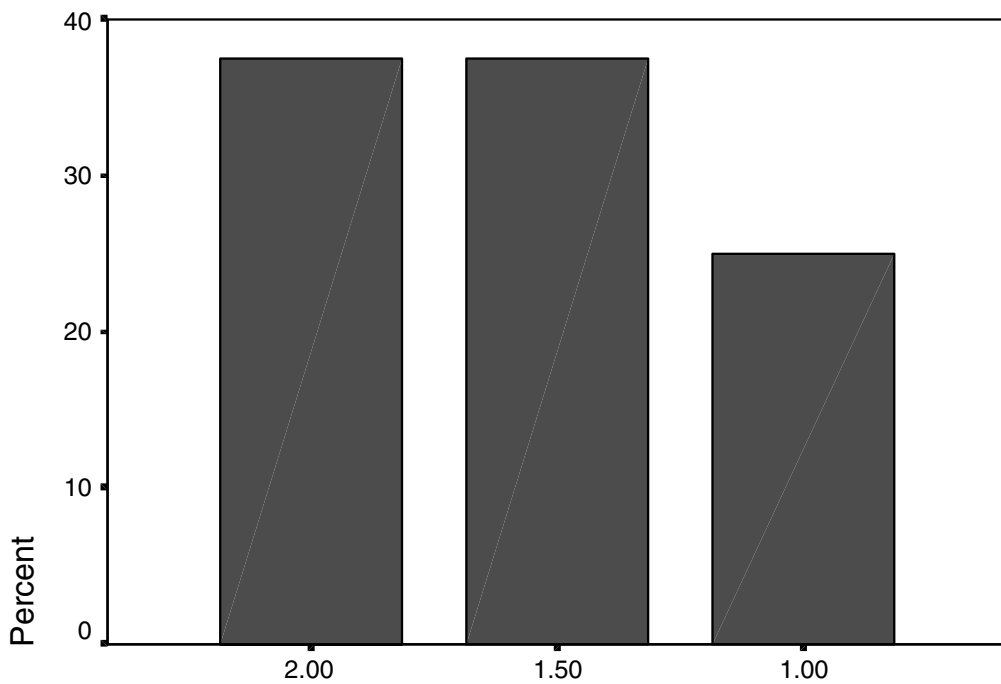


There is high demand for community managed improved water kiosks as demonstrated by a high willingness to pay for this service level. Most of the respondents who selected this service level do not wish to participate in management of the water kiosk.

**9.5.13 WTP for Service level 13: Privately managed ordinary water kiosk without shelter or storage tank in an informal settlement.**

38% of respondents are willing to pay the highest bid amount of KSh2/= per 20-litre container of water. 75% of respondents are willing to pay KSh1/50 or more per 20-litre container of water month. The weighted mean willingness to pay for this service level is KSh1/50 per 20-litre container of water. 75% of respondents are willing to pay the weighted mean. The full results are illustrated in the bar chart below Figure 23).

**Figure 23. WTP (KSh): Service Level 13**



WTP (KSh) Service Level 13

Most respondents expressed willingness to pay for improved water kiosks and there is hardly any demand for this level of service. There were only a few responses and the willingness to pay is very low.

## 9.6 Revenue calculations for proposed water supply options

It is proposed to supply water through seven service options. Revenue obtained from each service option is estimated as shown in the following calculations.

### 9.6.1 Service option 1: 12-24 Hour supply at individual House connection

Market segment: Bungalows & maisonettes

Population =175,000  
 Consumption rate =150 litres/capita per day  
 Annual Consumption  $= (175,000 \times 150) \times 365 / 1000 = 9\,581\,250\text{ m}^3$

Market segment: Flats

Population =105,000 (80% with individual flat connections)  
 Consumption rate =100 litres/capita per day for individual connections  
 Annual Consumption  $= 80/100 \times (105,000 \times 100) \times 365 / 1000 = 3\,066\,000\text{ m}^3$

Market segment: 1,2 or 3 roomed dwelling and Swahili houses

Population =280,000x25%=70 000  
 Consumption rate =80 litres/capita per day for individual connections  
 Annual Consumption  $= (70,000 \times 80) \times 365 / 1000 = 2\,044\,000\text{ m}^3$

Total consumption for service option  $= (9\,581\,250 + 3\,066\,000 + 2\,044\,000)$   
 $= 14\,691\,250\text{ m}^3$

Tariff for service option = KSh60/m<sup>3</sup>

Projected income from service option  $= 14\,691\,250 \times 60$   
 $= \text{KSh}881\,475\,000$

### 9.6.2 Service option 2: 12-24 Hour supply at shared flat connection

Market segment: Flats

Population =105,000 (20% with shared flat connections)  
 Consumption rate = 100 litres/capita per day for shared flat connections  
 Annual Consumption  $= 20/100 \times (105,000 \times 100) \times 365 / 1000$   
 $= 766\,500\text{ m}^3$

Total consumption for service option  $= 766\,500\text{ m}^3$

Tariff for service option = KSh55/m<sup>3</sup>

Projected income from service option  $= 766\,500 \times 55$   
 $= \text{KSh}42\,157\,500$

### **9.6.3 Service option 3: 12-24 Hour supply at yard connection with utility storage tank**

Market segment: 1,2 or 3 roomed dwelling and Swahili houses  
 Population =  $280,000 \times 30\% = 84,000$   
 Consumption rate = 60 litres/capita per day  
 Annual Consumption =  $(84,000 \times 60) \times 365 / 1000 = 1,839,600 \text{ m}^3$

Market segment: Informal settlements  
 Population =  $140,000 \times 10\% = 14,000$   
 Consumption rate = 60 litres/capita per day  
 Annual Consumption =  $(14,000 \times 60) \times 365 / 1000 = 306,600 \text{ m}^3$

Total consumption for service option =  $(1,839,600 + 306,600)$   
 =  $2,146,200 \text{ m}^3$

Tariff for service option = KSh45/m<sup>3</sup>

Projected income from service option =  $2,146,200 \times 50$   
 = KSh107,310,000

### **9.6.4 Service option 4: 12-24 Hour supply at yard connection without utility storage tank (ordinary yard connection)**

Market segment: 1,2 or 3 roomed dwelling and Swahili houses  
 Population =  $280,000 \times 30\% = 84,000$   
 Consumption rate = 60 litres/capita per day  
 Annual Consumption =  $(84,000 \times 60) \times 365 / 1000 = 1,839,600 \text{ m}^3$

Market segment: Informal settlements  
 Population =  $140,000 \times 10\% = 14,000$   
 Consumption rate = 60 litres/capita per day  
 Annual Consumption =  $(14,000 \times 60) \times 365 / 1000 = 306,600 \text{ m}^3$

Total consumption for service option =  $(1,839,600 + 306,600)$   
 =  $2,146,200 \text{ m}^3$

Tariff for service option = KSh45/m<sup>3</sup>

Projected income from service option =  $2,146,200 \times 45$   
 = KSh96,579,000

### **9.6.5 Service options 5 and 6: 12-24 Hour supply at privately and community managed water kiosks with storage and structure**

Market segment: 1,2 or 3 roomed dwellings and Swahili houses  
 Population =  $280,000 \times 15\% = 42,000$   
 Consumption rate = 20 litres/capita per day  
 Annual Consumption =  $(42,000 \times 20) \times 365/1,000 = 306,600 \text{ m}^3$

Market segment: Informal settlements  
 Population =  $140,000 \times 80\% = 112,000$   
 Consumption rate = 20 litres/capita per day  
 Annual Consumption =  $(112,000 \times 20) \times 365/1,000 = 817,600 \text{ m}^3$

Total consumption for service option =  $(306,600 + 817,600) = 1,124,200 \text{ m}^3$

Tariff for service option = KSh25/m<sup>3</sup>

Projected income from service option =  $1,124,200 \times 25 = \text{KSh}28,105,000$

#### Domestic Consumption

Total domestic consumption =  $(14,691,250 + 766,500 + 2,146,200 + 2,146,200 + 1,124,200) \text{ m}^3 = 20,874,350 \text{ m}^3$

Total amount of water available for sale =  $43,800,000 \text{ m}^3$

Amount available for sale to industrial, commercial and institutional customers =  $(43,800,000 - 20,874,350) = 22,925,650 \text{ m}^3$

### **9.6.6 Service option 7: 12-24Hour supply to institutional and business customers**

Market segment: Commercial, industrial and institutional customers

Estimated total consumption for service option =  $22,925,650 \text{ m}^3$

Tariff for service option = KSh120/m<sup>3</sup>

Projected income from service option =  $22,925,650 \times 120 = \text{KSh}2,751,078,000$

### **9.6.7 Total projected revenue for all service options**

The total projected revenue from all service options is KSh881 475 000+KSh42 157 500+KSh107 310 000+KSh 96 579 000+KSh28 105 000+KSh2 751 078 000=**KSh3 906704500**

The proposed average tariff = KSh3906704500/43,800,000m<sup>3</sup>  
=KSh89/20 per m<sup>3</sup>

Proposed profit = Total projected revenue less required annual revenue  
=(KSh3 906 704 500-KSh3 854 400 000)  
=KSh52 304 500  
=US\$716 500 per annum

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