THE USE AND APPROPRIATENESS OF DIFFERENT ECONOMIC INSTRUMENTS FOR WATER DEMAND MANAGEMENT AT BUFFALO CITY MUNICIPALITY

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in the intirety or in part submitted it at any university for a degree.

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Dedication

This work is dedicated to my wife Nontobeko, my son Nkosingiphile and Nontsingiselo Mgoqi for being there for me when I needed support, and for all the sacrifices they have made.

ABSTRACT

Water demands are growing as a result of the increase in living standards as well as population and economic growth. On the other hand, water resources are limited in availability. The scarcity of water has led to a paradigm shift from supply management to demand management. Several laws and policies have been developed in South Africa to drive the need for water development management. The main objectives are to promote sustainable use of water, economic efficiency, cost recovery and water pollution control. To meet these objectives, several water demand management measures have been introduced which involve technical measures, financial incentives, legal instruments and institutional arrangements.

The concept of water as an economic good has received worldwide acceptance which has led to the potential role of economic tools in managing water demand. The use of economic tools in providing socially acceptable decisions, efficiency and addressing equity is in line with Agenda 21 and the Dublin principles.

The Buffalo City Municipality, like any water services authority, is expected develop water conservation programmes and promote sustainable use of water resources for its jurisdiction. One of the instruments that Buffalo City can use is water pricing. Water pricing is one economic instrument that has been widely used in water demand management. The success of water pricing structures depend on factors such as quality of administration, political and public acceptability, and sustainability of water supply. Coupled with this, is a proper policy framework that promotes public awareness. Failure to consider these factors, when designing water price structures affects the effectiveness of the instruments negatively. A Buffalo City Municipality investigation revealed that there is considerable understanding of the need to price water at a marginal cost level. It showed that the water pricing structure used that accommodates equity and efficiency , primarily serves the purpose of financial sustainability through cost recovery and sustainable use of water through use of pricing structure. However, the effect and the appropriateness of the pricing structure cannot be easily measured because of a poor billing system and administration incapacity.

OPSOMMING

Die vraag na water is besig om toe te neem as 'n gevolg van 'n verhoging in lewensstandaarde, sowel as bevolkings- en ekonomiese groei. Aan die ander kant is die beskikbaarheid van waterbronne beperk. Die skaarsheid van water het aanleiding gegee tot 'n paradigma skuif vanaf bestuur van voorsienning tot die bestuur van aanvraag. Om die behoefte vir water ontwikkelingsbestuur te rig is wetgewing en beleide ontwikkel. Die hoofdoelwitte is die volhoubare gebruik van water, ekonomiese doeltreffendheid, koste herwinning and waterbesoedelingsbeheer. Om hierdie doelwitte na te streef, is verskeie water aanvraag bestuursmaatreëls in plek gestel wat tegniese maatreëls, finansiële insentiewe, regsintrumente and institusionele reëlings behels.

Die potensiële rol wat ekonomiese intrumente in die bestuur van water aanvraag kan speel volg na die wêreldwye aanvaarding van water as 'n ekonomiese middel. Die benutting van ekonomiese instrumente in die voorsiening van sosiaal aanvaarbare besluite, doeltreffendheid en gelykheidberegtiging is in lyn met Agenda 21 en die Dublin beginsels.

Dit word van die Buffalo City Munisipaliteit, soos van enige ander water dienste owerheid verwag om water bewaringsprogramme te ontwikkel en die volhoubare benutting van water hulpbronne binne sy jurisdiksie te bevorder. Die vastelling van die prys van water is een van die ekonomiese instrumente wat Buffalo City kan gebruik in die bestuur van water aanvraag. Die sukses van water prys strukture hang af faktore soos die kwaliteit van administrasie, politiese en openbare aanvaarbaarheid en die volhoubaarheid van water voorsienning. Gekoppel hiermee is 'n behoorlike beleidsraamwerk wat openbare bewustheid bevorder. 'n Gebrek om hierdie faktore in ag te neem by die ontwerp van water prys strukture impakteer negatief op die effektiwiteit van die instrumente. 'n Ondersoek by die Buffalo City Munisipaliteit het aan die lig gebring dat daar 'n aansienlike begrip vir die behoefte om water teen die marginale koste vlak te prys, bestaan. Dit het ook getoon dat die water prys struktuur wat gebruik word wat beide gelykberegtiging en doeltreffendheid te akkomodeer, die oogmerk van finansiële volhoubaarheid deur middel van koste herwinning en die volhoubare benutting van water tot 'n groot mate bevorder. Nie te min kan die effek

en toepaslikheid van die prys struktuur nie maklik gemeet word nie as gevolg van 'n swak rekening stelsel en 'n gebrek aan administratiewe kapasiteit.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter gives a synopsis of the water situation in South Africa and highlights the role of economic instruments in promoting the efficient use of water resources.

Apart from the background to water demand management, this chapter presents the rationale, research statement, main research question, objectives, assumptions, demarcation of research, type and extent of research, and subject demarcation.

The central theme of the thesis is that water is essential and a scarce natural resource that needs to be efficiently utilized in order not to deprive the next generation.

1.2 Background

South Africa is a dry, water scarce and stressed country with the annual average rainfall of 497mm (Kombe, 2002:3). To meet water demand, South Africa is expected to develop water demand management strategies that will foster efficient use of water resources.

Water demand management aims to help institutions that are responsible for water provision to shift from a supply-based focus to an integrated demand management-based approach.

The key principle of the latter approach is an increased emphasis on sustainable water resources management. Water demand management (WDM) means decision-making on the development and management of water provision for various uses taking into account the needs and desires of different users. It requires a consultative and participatory approach. To pursue WDM, several factors need to be assessed. The following are some of the components that can have impact on WDM initiatives: Constitutional and legislative framework, relationship between role players and availability of human and financial resources, amongst others.

The context for the development of constitutional water policy frameworks and programmes plays a crucial role in shaping the direction and operation of each role player's operational and organizational functions. Constitutional water policy frameworks also create a platform in which conflicts and problems between the different users can be reduced. These create an enabling environment that allows different users to function.

To make WDM effective, localised policies and institutional development policies need to be established. These should include human resources development, for those organisations that are expected to execute these local policies.

Water demand management is a process of assignment of function to community and water systems - setting norms, making allocations for use, enforcement, and continuous assessment of its effectiveness. This includes regularly gathering information and analysing the physical and socio-economic process. As a process, WDM requires effective control and sanctioning of violations in a transparent and participatory manner.

This includes creating suitable conditions that allow and give respective water authorities a mandate as well as the financial and human resources to carry out WDM tasks. Water authorities should have a proper understanding together with effective tools that provide them with current information on various situations.

In order to fulfil specific needs and demands of individual stakeholders, WDM programmes have to be acceptable and be seen as a tool that solves water provision problems. Consequently, the WDM process involves proper coordination, planning, and effective consultation. Monitoring and evaluation of WDM initiatives should be implemented timeously. It should assist local government in setting water allocation and control systems that promote water and financial sustainability of their services. It should be based on local water consumer information. The consumer information has to be an essential part of activity of WDM strategy. Some of the crucial information that is essential includes the poverty profile, current population, and service typology and consumption pattern.

The viability of WDM initiatives have to be continuously measured against its objectives. Efficiency as one of the main objectives of WDM has to be clearly spelt out and clearly defined. Consequently, a proper financial analysis and feasibility study has to be done before the programme can be implemented.

Efficiency also includes equity, which means the poor are the primary intended recipients of WDM as it improves equitable efficient and sustainable use of water. This benefit would be financed through cross-subsidization. Although there is no commonly accepted model for WDM, there is general understanding about the importance of using water resources in an efficient and sustainable manner. Again, there is an agreement on the importance of local discretion over WDM programmes and initiatives. The responsibility of WDM is seen as a local responsibility. However, it has to be in line with the national framework of norms as provided by the constitutional and national legislative framework. The ideal WDM model that will be used should cater for all different users and ensure financial sustainability of the services rendered. There are numerous water demand management measures that can be used including technological, behavioural, economic and institutional. However, the WDM measures chosen by local authorities should be informed by the reality faced by the individual local authority.

Increased scarcity of water and ever-increasing costs for the provision of water has forced countries around the world to invest large amounts of resources on water provision and conservation. However, recent assessments show that performance of water institutions, in terms water sustainability and efficiency, is low. Several WDM initiatives have been timidly introduced but their efficiencies are generally low in comparison with their expected potential. Many times, politics is the main cause of WDM failure.

The change in focus from management of supply to management of demand has been accepted worldwide and is seen as most efficient way of managing water resources. Managing demand involves minimizing volumes in order to place water supply on a sound economic, social and environmental footing, while assuring rates of return comparable to the investments.

It has been proven that inadequate operation and management of water resources are often a major cause of conflict amongst water users. Many water institutions have found it increasingly difficult to finance the cost of water supply or to build more water supplies. This led to a vigorous debate around methods of efficient use of water and resulted in consensus on the need for a comprehensive approach that includes cost recovery for water services. Cost recovery arguably has been seen as the best vehicle to use to address effective, efficient, equitable, and sustainable provision of water services. Economists have convinced the majority of scholars in the water sector to accept the notion that water has to be seen as economic good. Those who still see water as commodity have struggled to develop any convincing argument on how their approach will address equity, financial sustainability of service providers and sustainability of water resources.

Those who see water as an economic good strongly believe that initiatives such as WDM address both equity and sustainable use of water resources. The utilisation of economic principles such as pricing of water can be used to change behaviour of water users and can be an effective tool for protecting the poor. Literature suggest the use of WDM economic instruments is one of the best methods in ensuring social equity and environmental sustainability. Economic instruments have been adopted as a way forward to foster efficient use of water resources and to change behaviour of water misuses.

South Africa and Namibia are among the few countries in the southern African region that have developed multi-faceted water demand management (Boonzaier, 2000:7). According to Boonzaier, WDM is provided for in the Water Service Act 108 of 1997 and National Water Act 36 of 1998. The Water Service Act 108 of 1997 has a provision for the use of tariffs to achieve water conservation.

Water tariffs are one example of economic instruments that can effectively promote efficient and effective use of water resources. Cantin, Shrubsole & Ait-Ouyahai (2005:2) suggest the following economic instruments that can be used to promote water conservation:

- Property rights;
- Fee based measures; and
- Liability and insurances.

Property rights, charges, fees and fiscal instruments are used to make consumers account for the full value of water and other environmental resources which they use to carry out domestic and economic activities. This ensures their activities are conducive to the sustainability of water and environmental resources. The fact that the consumer having to bear the costs serves as a deterrent in the exploitation of valuable resources.

However this approach requires a clear understanding of the costs involved with the use of the water resources. The value placed by the user on water has to be balance against the water cost and is important for financial sustainability.

On the other hand, quantifying the value of water for use may be difficult. The willingness to pay may be influenced by the ability to pay. Unlike other goods, water is different. It does not have an alternative, which also may cause inconsistencies in quantifying its value. Therefore any economic instrument used for water demand management has to be adjusted to accommodate the societal objectives such as poverty and sizes of households. This mean the instrument has to ensure the coordinated development and management of water by maximising economic and social welfare without compromising the sustainability of water and its environmental systems. Hence, the instrument has to be both flexible and economic wise efficient as well as outcome-based. It should not be seen as a substitute for regulation rather as a supplement.

The idea of integrating economic instruments with regulations may lead to better solutions for water conservation problems and has to be seen as the starting point for WDM. It is important that the economic instrument used is characterised by the context, which it is expected to deal with, that is, it is more about optimising water systems and institutions on the basis of physical and economic criteria. It has to be seen as preventing damage by influencing behavioural change and controlling systems through the promotion of interaction of society with nature within acceptable conditions. One should be able to clearly define relationships between the price of water and its consumption, and its legitimate acceptance on the political front. This implies that the instrument has to be developed in a local-specific way that promotes attitudes and culture that are water conservation friendly as well as serving to improve social and economic conditions. While the instruments used may have range of

objectives, it has to have a social policy component, which accommodates low income or poor households. To be able to manage the economic instruments for water demand, one has to able to define WDM metrics. Metric of economic instruments should consider efficiency, equity, optimality and viability. To quantify the contribution of economic instruments to sustainable use of water, one has to weigh various criteria such as affordability, financial sustainability and human resources capacity of the water system, efficiency and responsible use of water resources.

The development of management capacity and capabilities to drive WDM is also important. The development of WDM strategies has to incorporate both top-down and bottom-up processes. Similarly, the development of capacity and capabilities should apply the same approach. Strategic and operational planning requires an effective and transparent accountability mechanism.

Accountability mechanisms will allow internal and external stakeholders to monitor and control each other's interactions in mutual and transparent manner. Each will have clearly defined roles, which they are expected to perform. Each party will have clearly defined power to control and sanction violations. Power and control necessitate the need for education and training of all involved. The community, in particular, may not familiar with the concept of WDM. Capacity building, which includes education and awareness building, has to be used to support the implementation of WDM programmes. Education and training has to be based on the role each individual plays. For example, community representatives assigned to water have to receive water conservation and water economics training. Public officials, responsible for managing water resources, should receive training on any skills deemed necessary for the effective management of the water sector. Water managers have to equip themselves with communication, interaction and bargaining skills to supplement their technical skills. WDM should be managed in synergy with some core dependent programmes such as water quality and well-being of society. As drivers of WDM, they need to ensure that those participating in water structures represent designated groups of society.

Economic instruments for WDM rely also on the availability of information and the capacity to use it to make decisions or to predict implications of individual courses of action. It is important that water institutions develop systems that establish an

environment conducive to the knowledge related to WDM. Attention to the societal levels of literacy and education is important. Information should be simplified to accommodate all people.

In terms of the Municipality System Act 32 of 2000, local authorities must set tariffs that ensure cost recovery. This implies the water price is to be charged at marginal cost. Full-cost pricing has been seen as not only suitable for WDM but also for sustainability of water service delivery. The use of full-cost pricing has to be complemented by targeted subsidies to cushion the poor. It is therefore important that the implementation of full-cost pricing be developed within a wider perspective so that it does not cause widespread heterogeneities in terms of access to water.

Organizational structure can play a key role in implementing and designing effective instruments. If necessary, reorganization has to be done in order to help in carrying out WDM programmes in a coordinated manner. The organizational structure has to be informed by the need to improve efficiency and speedy implementation of decisions taken. The structure has to attach attention to issues such as ensuring a level playing field between poor and rich, flexibility and customer satisfaction. Reorganization has to increase the focus on outcomes rather than on processes and have sound accountability arrangements.

The developments that have taken place in the country, in particular Buffalo City, aim to address unemployment and poverty, and call for the reviewing of water demand options. In choosing an option, one has to consider whether that option is consistent with the principles of economic efficiency while also being simple enough so that consumers can understand it. The option has to be informed or reflect the understanding of social class divisions. This also includes understanding of socio-economic and political factors that may constrain the implementation of the economic instruments in terms of water demand management.

1.3 Rationale

The provision of adequate water to rapidly growing populations and the difficulties in securing user payments are becoming a major problem in South Africa municipalities (Marah, O'Donovan, Martin & Boberg, and 2004:2). In order to address this challenge, municipalities have two options:

- to increase or develop new water resources; or
- to promote water conservation.

The latter is more sustainable since it promotes the efficient use of water resources. However, should the tools not encourage efficient, equitable provision of water resources or are not understood by the targeted group, it might creates unnecessary conflict that may be costly to water providers or suppliers. Water demand management initiatives have to signal scarcity and cover production costs.

Buffalo City Municipality is situated in the eastern region of Eastern Cape Province with the population of 860 000 and 111 000 households (Buffalo City Municipality Water Service Development Plan 2003). Of all cities in the Eastern Cape Province, indications are that the Buffalo City Municipality will soon show the greatest rate of increase in water service demand, if one considers the growth of economic activities as result of East London Industrial Development Zone (IDZ). These developments call for a reviewing of water demand options and considerations of the range of instruments to determine the best option. The best option has to be consistent with the principles of economic efficiency. It has to be easily understood by both implementers and the target group, that is, the consumer.

The other challenge faced by Buffalo City Municipality is increased pollution of the Buffalo River and other rivers that are sources of water. According to Section 12(1) of Water Services Act No 108 of 1997, it is the responsibility of local government to protect and prevent pollution and degradation of water resources.

It is for this reason that the author sees as important the investigation of whether the economic instruments used by Buffalo City Municipality encourage the efficient use of water resources.

1.4 RESEARCH STATEMENT

Water demand strategies may be a source of conflict. Hence it is important that water demand management initiatives that are adopted reflect and be founded on the understanding of what influences water demand behaviour and the socio-economic environment of the targeted population. The instruments used should be capable of meeting the following objectives:

- Social equity,
- Economic efficiency, and
- Sustainability of water supply and services.

1.4.1 THE MAIN RESEARCH QUESTION

What economic instruments for water demand management are used in the Buffalo City Municipality and how appropriate are they?

1.4.2 OBJECTIVES

- Investigate the economic instruments used to reduce the demand for water in Buffalo City Municipality.
- Investigate the potential impact of these economic instruments on consumers.
- Investigate the ease of understanding and implementation.
- Investigate the consistency with the principles of economic efficiency.

1.4.3 ASSUMPTIONS

In general, the assumption is that the economic instruments that apply conscious efforts to facilitate continuous and more effective improvements are likely to be useful (Cantin, Shrubsole & Ait-Ouyahia, 2005:9).

1.4.4 DEMARCATION OF RESEARCH

Demarcating the research study ensures that the research is focused and manageable. The omission of certain topics does not imply that there is no need to research them.

1.4.5 TYPE AND EXTENT OF RESEARCH

This study will be conducted at Buffalo City Municipality. The research will focus on water and sanitation, bulk and retail water and water services for households and the appropriateness of the economic instruments being applied.

1.4.6 SUBJECT DEMARCATION

The study will be limited to economic instruments, and not related aspects such as technical instruments that involve, for example, leakage detection and reduction of illegal connections.

1.5 SUMMARY

This chapter has looked at the background of water demand management. It has been stated that water scarcity is a serious challenge to the future development of South Africa. To address the shortcomings and challenges in water resources administration, several initiatives has been suggested. However, for the purpose of the research, the focus was on economic instruments as tool for water demand management. Water pricing has been identified as the most common instrument used. To make water pricing effective, an enabling environment has to be created. The next chapter will highlight some of the factors that create enabling environment for water pricing. These factors include South Africa's legislative framework and national strategies that assist in the development of economic instruments for water demand management.

CHAPTER TWO

WATER DEMAND MANAGEMENT

2.1 INTRODUCTION

In the previous chapter, it was established that economic instruments could be an effective tool to improve the efficient and effective use of water resources. It was shown that several countries including South Africa recognized the need for using economic instruments in managing water demand. On the other hand, some basic questions are posed such as the following:

- Can the economic instruments be the effective tools for demand management?
- How can economic instruments be employed without disadvantaging the poor?
- Whether economic instruments can be employed to change human behaviour towards the use of water resources?

This chapter attempts to answer these questions by building upon the preliminary theoretical assertions and recent experience in the application of these questions and other related aspects under the following sub-heading:

- Economic instruments for water demand management,
- Familiar water demand management models,
- Constraints in implementation of these models,
- Regional water demand management initiatives,
- South Africa's legislative framework,
- Water management in South Africa,
- Water demand management in South Africa,
- Institutional determinants of the feasibility of economic instruments,
- Types of water pricing, and
- Challenge in designing water pricing structures.

Finally, an attempt is made to present a comprehensive procedure and framework for economic instrument evaluation.

2.2 BACKGROUND FACTORS

Water demand management can be seen as a process that ensures the effective and efficient use and administration of water resources to meet the needs of human beings and the environment (Levite, Sally & Cour, and 2002:2). In seeking to balance the water needs of the natural world and human beings, several plans, methods and approaches have to be developed to pursue objectives of water management.

Sustainable delivery of water service depends on how budgets have been allocated and how prioritization has been done. Water, as scarce resource, is expected to receive more attention. New water laws that have been introduced also demonstrate this focus. These laws ensure balance between efficiency, sustainability and equity. Balancing sustainability and equity is becoming the major challenge in recent years as the world is experiencing population growth, especially in the cities. It has been proven that population growth puts more stress on water resources (Sauri, 2003:3). Littering, industrial waste and malfunctioning of sewage systems are some of major causes of water pollution which are a direct result of increases in population sizes.

The provision of water in an ever-increasing population is also a major challenge. Increases in population sizes and changes in peoples' quality of life also lead to increased water consumption which consequently increases the demand of water supply. If one compares the amount of water consumed by people in urban areas with people in rural areas, one may find that people in rural areas consume far less water than people living in urban areas (Otieno &Ochieng 2004:3).

Several initiatives have been launched with the aim of promoting water conservation. Economic, technological and behavioural aspects are some of initiatives that have been introduced to promote conservation of water resources (Sauri, 2003:4). These instruments, together with other models, specifically developed to promote water conservation, show some interdependence of each other and there is possibility that both should be enforced simultaneously. Water conservation that focuses on detecting leakage and illegal connections can be done in parallel with educational, water pricing and legal measures.

2.3 ECONOMIC INSTRUMENTS FOR WATER DEMAND MANAGEMENT

Within the context of this particular study, economic instruments for water demand management have been seen as one of the possible solutions for current and future water shortages. Water pricing is so far the most popular tool for water demand management. If one considers basic economic theory, one may assume that any change in the price of water is likely to encourage consumers to respond. Should the water price increase, then it is likely to encourage consumers to use less water. As water does not have alternative, it is expected that the price elasticity of demand of water will be positive. As price of water increases, it also affects sectors that depend on water for their production. For example, the vegetable farmer is likely to use efficient water conservation methods if water price increases. While it is also possible that the farmers may transfer the cost to vegetable buyers, it is unlikely that the farmer may choose that option. This also applies to domestic users. If the domestic users are aware of efficient methods for conserving water, the domestic consumer will prefer to apply those methods than to spend more on water.

2.4 FAMILIAR WATER DEMAND MANAGEMENT MODELS

2.4.1 WATER EVALUATION AND PLANNING (WEAP) MODEL

The Water Evaluation and Planning (WEAP) model involves applying adequate economic methodology, engineering judgment and expertise in selection of a "best and least" cost option to manage water resources. According to Levite, Sally & Cour (2002:4) the WEAP model involves:

- Problem definition including timeframe, special boundary system components and configuration;
- Establishing the current account, which provides a snapshot of actual water demand, resources and supplies for the system;
- Building scenarios based on different sets of future trends based on policies, technological development, and other factors that affect demand, supply and hydrology; and
- Evaluating the scenarios with regard to criteria such as adequacy of water resources, costs, benefits, environmental impacts and others.

The model attempts to manage water demand rather than the supply of water. It concentrates on discouraging the promotion of supply-sided projects which have failed to meet growing demand.

2.4.2 INTEGRATED RESOURCES PLANNING MODEL (IRP)

Integrated Resources Planning model (IRP) is a comprehensive approach to water demand management, which involves least-cost analyses of the demand-side and supply-side management options. The model promotes an open and participatory decision making process in order to incorporate community needs and environmental issues (Maddaus 2002:3).

The model seeks to balance the needs of two important role players which are human and the environment through planning methods that evaluate all benefits and costs. The IRP models steps include (Maddaus 2002:4):

- Demographic trends, historic water use, economic indicators and climate data which are needed to prepare water demand forecasts.
- The existing and planned conservation programmes, such as plumbing codes, landscape ordinances, where rebate programmes have been accounted for in the forecasts.
- Forecasts are needed for normal, dry year, and critical dry year conditions, wet years in future.
- Supply-side planning which starts with the safe yield of existing suppliers and, if inadequate for future needs, locates alternative ground or surface water suppliers to meet all or part of the future demands.
- Demand side planning which identifies additional conservation methods and waste water reclamation projects to reduce demand and qualifies their costs and savings. In addition, short-term demand reduction possibilities in critical dry years are quantified.
- The supply reliability evaluation ties together the probability of a supply shortage with the short-term demand reduction that could be used to balance supply and demands droughts. The result is tabulation of the magnitude and frequency of imposition of mandatory short-term demand reduction programmes.

- Evaluating resource strategies involves traditional economic analysis plus consideration of water quality and other environmental impacts.
- The utility goals and policies enter into the evaluation of supply reliability and the resource strategies.
- Financial planning is needed at the end to assure that the IRP projects can cause a reduction in water demand that needs to be factored in.
- Public input is shown at couple of key points, but needs to be recognised as continuous throughout the process.

2.4.3 ECONOMIC ANALYSIS MODEL

This model focuses on developing water-based programmes that rely on price and income elasticity. It depends on availability of a reliable and well-structured integrated database. This model requires a well-organised team, strong management and administration structure in order to be effective. Inadequate billing systems and record keeping are major contributors to the failure of this model.

2.5 CONSTRAINTS IN IMPLEMENTATION OF MODELS

The success of water management depends on several factors. These factors include:

- Availability of proper information;
- Expertise;
- Proper funding; and
- Inadequate community education programmes or campaigns.

The unavailability of proper information systems and technologies are the major reasons for the failure of urban water demand management in southern African countries according to Gumbo, Juizo & Van der Zaag (2002:2). Several constraints that hinder effective implementation of water demand initiatives are:

- Non- availability of information technology which includes expertise and equipment;
- Belief that water is a natural gift which must be available free of charge;
- Social inequity;
- Improper management of water institutions; and

- Increased supply-side subsidies

To address the constraints of implementation of water demand management, Turton (2001:49-51), in his analytical paper, suggested the following strategic action:

- Policy guidelines for water demand management must take into consideration the fact that institutional development is un-even and non-uniform;
- Recognition of informal water management institutions, particularly where service delivery is under pressure and formal institutions are underdeveloped;
- Focus on developing capacity to generate and manage data;
- Focus on political will, which means the focus should not be overly concerned about a negative political hostile response;
- Placing water the top of the agenda for sustainable development;
- Focus on incremental application of water demand management.

2.6 WATER SECTOR REFORMS

Water sector reforms have taken place in many countries across the world. These reforms are aimed at transforming the water services providers into conservation-conscious enterprises. Water is no longer seen as a commodity but as a market good. Cost recovery and the reasonable profit of the water sector are deemed to be necessary to produce water and to achieve sustainable development. Reasonable profit is deemed necessary to enable the water sector to achieve sustainable development of water supply services and reduce financial assistance from government.

The reforms are being used to promote the fair, equitable, sustainable and efficient utilisation of water resources. These have been introduced in a manner so that there is minimum economic, social and political disruption. The intention for these reforms is to provide appropriate incentives to customers to use water rationally and improve service delivery. The principles that drive these reforms are based on promotion of economic efficiency, self-financing and equity.

The people who are instrumental in the promotion of these reforms believe that institutions responsible for water resources have to meet the acceptable norms and standards set by the community they serve. Proper communication and development of effective models that provide decision makers with accurate information is critical

to the success of these reforms. There is a strong view that people are willing to pay for water, provided they are informed, have been properly educated, and satisfied with service delivery.

The level of willingness to pay means people will be prepared to pay for amount of water they have used if they understand the reasoning behind the set price. Economic principles indicate an organisation is operating efficiently when it operates at the point where its marginal cost is equal to marginal revenue. This implies water pricing has to be set or adopted to marginal cost principles. Several literature sources argue that applying marginal cost principle to price of water will encourage efficiency.

The marginal cost principle is seen as the best method for encouraging the efficient and effective use of water. Therefore, one can say that these reforms also promote the consideration of incremental cost in order to cover the total and future investment costs to address or meet future demands and to ensure financial stability.

This has led to increased demand for the metering of water consumption for individual users, which enables full cost-recovery and eliminates free riders. In order to address the concerns of the poor, water reformists have proposed subsidies and free basic water services at specific volumes.

According to South African water laws, water pricing has to promote efficiency, reflect marginal costing and take cognisance of location and catchment variations. There is a strong suggestion that the proposed price of water should reflect water resource management costs as well as financial sustainability which requires that revenues equal the cost of supplying (White Paper Water Policy for South Africa, 1997).

To achieve this, the South African National Water Act No. 36 of 1997 gives power to the Minister of Water Affairs and Forestry to establish pricing strategies that may differentiate among geographic areas and categories of water users. Water charges may be instituted to:

- Fund the direct and related costs of water management;
- Achieve an equitable and efficient allocation of water;

- Ensure compliance with prescribed standards and water management practice according to user pays and polluter pays principles;
- As a means of encouraging reduction in waste; and
- As an incentives for effective and efficient water use.

Lundqvist & Gleick (1997:30) in Turton (2001) list the following as Dublin principles:

- Water is a finite, vulnerable and essential resource which should be managed in an integrated manner;
- Water resources development and management should be based on a participatory approach involving all relevant stakeholders;
- Women play a central role in the provision, management and safeguarding of water;
- Water has an economic value and should be recognised as an economic good, taking into account affordability and equity criteria fairness. Affordability and equity criteria are the key cornerstones for the National Water Act's (No 36 of 1998) pricing strategy.

One may outline the objective of water reforms as follows:

- To promote economic efficiency to minimize the total cost of meeting the services area's water needs;
- To be as fair as possible to water users and the public;
- To support all costs involved in the provision of water;
- To provide a cushion against fluctuations in demand and natural conditions;
- To promote conservation of water as a scarce resources; and
- To promote equity.

The suggestion is that the implementation of reforms should be smooth if one wants to have public support.

2.7 REGIONAL WATER DEMAND MANAGEMENT INITIATIVES

A study by Beuhman (2002:3) drew a conclusion that only South Africa and Namibia have policies that incorporate water demand management in the southern Africa region. The Beuhman study found:

- A serious lack of awareness of water scarcity and water demand management;
- Institutions that are responsible for implementation of water demand management programmes are under-capacitated and are ill-defined;
- Major financial problems, due to non-payment of services rendered and small revenue bases as a result of high unemployment rates;
- Revenue generated is not necessarily fed back to water related projects, management and maintenance;
- Lack of training on demand management, higher education institutions do not offer such kind of programmes;
- Lack of political will with respect to water demand management; and
- Strong bias towards supply-side management.

The study indicates the South Africa region needs to pool water demand management resources through networking and the establishment of network pilot projects that will strengthen the capacity of individual countries to properly implement and mobilize political commitment for water demand management initiatives.

2.8 SOUTH AFRICAN LEGISLATIVE FRAMEWORK

Public involvement and participation in decision making is the guiding principle in all South African government activities. All South African laws are subject to the overriding authority of Constitution of Republic of South Africa, Act 108 of 1996. Sections 152 (1) (b) compel Local Government to provide service in a sustainable manner. The Section 27(1) (b) of the Constitution also gives all citizens the right to access clean water. To adhere to the Constitution, the National Water Act, Act 108 of 1998 and Water Services Act, Act 108 of 1997 ensures equitable access to water. The Water Service Act, 1997 section 4(3) states that water service providers may not deny a person access to basic water services, when a person demonstrates satisfactorily that s/he is unable to pay for basic services. The act gives powers to Local Government to determine or define the word "satisfactory".

The National Water Act 1998 gives the Minister of Water Affairs and Forestry powers and responsibility to provide an enabling environment for water services. These powers have been delegated to Local Government. Section 74 of the Municipal Structural Amendment Act, Act 33 of 2000 allows a municipality to make by-laws and enforce them, and includes water tariffs. The Water Service Act of 1997 (section 10(1) provides guidance and compels all municipalities to comply with the norms and standards that have been promulgated by Minister of Water Affairs and Forestry. In terms of the Water Service Act 1997, a volume of 6,000 litres of water per month per poor household has to be free. The act also provides the local municipality with the power to determine the amount of free basic water on the basis of affordability and availability of water. It is also a responsibility of local municipality to identify all households that fall within the poor bracket.

The National Water Act 1998 is one of the acts that demonstrate the move from riparian doctrine to the "reasonable and sustainable use" doctrine. The act serves to protect the water resources by legislating its use, development, conservation, protection and control. Acknowledging limiting factors in water delivery, due to monopolistic approach adapted in South Africa, the National Water Act 1998 defines how municipalities may obtain water for distribution to their customers and how they may minimize pollution of water resources when caused by effluent and waste water through recycling.

Beside the above-mentioned acts, South Africa has also introduced the Water Conservation and Demand Management Strategy Framework. The aim of the framework is to promote efficient and effective use of water guidelines for water institutions. The initiatives demonstrate the South Africa government's commitment of ending the inefficient use of water resources. While the policies and strategies developed may not always achieve their objectives, their presence may have positive impact on those to whom they are exposed. The present challenges, when looking at current situation in South Africa, include the availability of human capacity to implement these initiatives.

2.9 INSTITUTIONS INVOLVED IN WATER DEMAND MANAGEMENT IN SOUTH AFRICA.

As stated above, South Africa has introduced new water policy measures that incorporate water demand management with the aim of promoting the efficient use of water resources. To drive effective water management, South Africa has decentralised or localised the management of water resources. The Water Service Act 1997 and National Water Act 1998 have made provision for the following structures at local level:

- Water Boards;
- Water Service Authorities (WSA);
- Water User Associations (WUA); and
- Catchment Management Agencies (CMA)

The Minister of Water Affairs and Forestry has delegated powers to these institutions to manage and facilitate the involvement of the local community in water-related decision-making. The following are some of the principle municipal functions of the above structures (Pergram & Mazibuko, 2003:6):

- To prevent water from any water resources being wasted;
- To protect water resources;
- To prevent any unlawful water use;
- To remove or arrange to remove any obstruction unlawfully placed in a water course;
- To prevent any unlawful act to reduce the quality of water in any water resources;
- To exercise general supervision over water resources; and
- To regulate the flow of any water course.

Catchment Management agencies (CMA) have been established in terms of National Water Act, 1998. According to the act, the Minister of Water Affairs and Forestry may assign the Catchment Management Agency as a responsible authority with the following duties and powers (Schedule 1 of National Water Act 1998):

- To manage and monitor permitted water use within its water management area;

- To conserve and protect the water resources and resources quality within its management area ;
- Subject to the provisions of the act, develop and operate a waterwork in furtherance of its catchment management strategy;
- To do anything necessary to implement catchment strategies within its water management area; and
- Give notice to a person taking water, and after having given that person a reasonable opportunity to be heard, limit the taking of water.

Agencies will also exercise control over dams for recreational use. They can delegate environmental conservation to local authorities if those authorities demonstrate that they have capacity to perform those tasks exists. The CMAs will interact with other institutions such as Water Boards and Irrigation Boards. The Irrigation Boards do not have water supply functions. Their main functions are supervision, control and distribution in terms of National Water Act 1998.

Water Boards have the primary objective of providing water services to other water services institutions such as Water Services Authorities which are responsible for water provision. The overall responsibility for water protection and the administration of water legislation lies with the Department of Water Affairs and Forestry.

2.10 WATER CONSUMING SECTORS

According to the White Paper on the National Water Policy for South Africa 1997, the water consuming sectors are:

- Agriculture (both irrigated and rain-fed agriculture as well as forestry) which is currently the largest user of water although it does not demand as high a reliability as other sectors;
- Industry (including manufacturing, mining and power generation) users whose total consumption is not so great but whose requirements for quality and reliability as well as whose impact on quality through land use and waste discharges impose considerable pressure on the resources;
- Domestic and municipal users whose water use and impact on water quality is growing rapidly due to the expansion of services and the improvement of service standards; and

- Recreational and ecotourism uses which are growing and have high quality standards to protect human health and sometimes require large allocations as well as controls to protect habitat in the case of ecotourism development.

Only 20% of exploitable water is used by urban users which means most of the exploitable water from surface and underground is used for irrigation purpose (WRC report No. 574/1/98:2).

2.11 POLLUTION AS CONSUMER

Much water is lost due to incorrect management of waste water from domestic and industrial use. Disposal of untreated wastewater and seepage from poorly constructed and maintained sanitation facilities are major sources of water pollution. South Africa is dominated by informal settlements which do not have good sanitation systems. Many times, water streams that pass through these informal settlements end up as carriers of sewage and greywater.

Incorrect methods of farming are also sources of pollution that affect the quality of water resources. The waste by domestic and small industrial users rises as the population increases. Increased pollution in water reduces the availability of safe water. Pollution not only reduces the availability of safe water but also increases the cost of water purification. Based on this understanding, that Department of Water Affairs and Forestry has made a principle decision that the cost of treatment of industrial and domestic effluents has to be borne by those who cause the pollution.

2.12 QUALITY ASPECT OF WATER MANAGEMENT

The policy of water quality management in South Africa follows the line of introducing minimum effluent standards in order to maintain the health of the ecosystem. It promotes best practice by reducing the amount and the degree of pollution of the discharges by:

- Empowering representatives of community associations administering local water resources, which includes training in administration as well as guidelines to explore development opportunities;

- Assessment related to efficiency of water use for social requirements including exploitation of development opportunities;
- Identification and prioritization of areas requiring special attention to redress past imbalances and to stimulate water related development in specific areas of latent potential.

Local communities have been given powers to define desired water quality management plans and controls in order to achieve the set national water quality goals. River health programmes have been designed to continuously evaluate the quality status of rivers and to set the requirements that are oriented towards optimal use of rivers while still being cognizant of the how the use of the river affects the system.

There are many quantitative aspects of water management which involve the cooperative efforts in areas such as joint financing and include an assortment of organizations such as the Department of Water Affairs and Forestry, Provincial Government and Local Municipalities. Other areas of collaboration include overall planning of water resources management, drinking water supply, engineering works and protection of water against pollution.

2.13 INSTITUTIONAL DETERMINANTS OF THE FEASIBILITY OF ECONOMIC INSTRUMENTS FOR WATER DEMAND MANAGEMENT.

The difficult challenge faced by the people responsible for implementing the most effective and suitable economic instruments is to design an economic instrument which is consistent with the many conflicting objectives of the water sector. Though designing is crucial, the legitimacy depends on many factors which determine the success or failure of the economic instruments used. The following are some of the factors that may influence an instrument's success:

- Political and public acceptability;
- Sustainability of water supply;
- Communication; and
- Flexibility and consideration of diversity.

2.13.1 POLITICAL AND PUBLIC ACCEPTABILITY

The issue of water services is highly politicized and sensitive. The involvement of customers in the decision-making process may have a huge impact in unlocking the success of the process. It is crucial for those involved in the development and implementation of economic instruments to cultivate friendly and cooperative relationships with all relevant stakeholders. All stakeholders have to be kept abreast of developments within the water sector in order to overcome or minimize misleading or inaccurate information. If necessary, the water sector may have to bring in outside expertise that can help with legitimizing their positions. The success of the instrument or any positive dramatic results that benefit the public has to be displayed, and any profit gained has to be plough back into improving water service delivery. Informal partnerships with influential individuals within the community may also be important when water sector wants to sell new ideas or want to introduce changes.

2.13.2 SUSTAINABILITY OF WATER SUPPLY

The study by Schoeman (2002) & Cardone & Fonseca (2003) in Schoeman & Magongoa (2004:38) shows that the sustainability of service is the major factor in influencing the willingness to pay. Dissatisfaction and resistance to pay for services can be used to measure the level of sustainability of services. According to Schoeman & Magongoa (2004:32), the following factors have a negative impact on the willingness to pay:

- Not receiving accounts;
- Poor quality, polluted water;
- High cost;
- Meters not read;
- Frequent leaking and blockages;
- Poor communication; and
- Non-consultation.

The water sector institution is expected to set its own standard in consultation with the stakeholders. A bottom-up approach has to be adopted which puts emphasis on involving ordinary members of the public. People have to be informed about issues relating to water services delivery, particularly those aspects such as water

cut-offs, changes in quality of water, and any new developments aimed at improving the effective delivery of services. Community confidence in a water sector institution's intentions contributes to positive attitudes and quick acceptance of any changes introduced by the water sector.

To build confidence, institutions are expected to make their actions consistent with their intentions. They have to continuously inform their stakeholders about their intentions and invite feedback on how well they are achieving them. It is also important that these institutions maintain a high level integrity and build a good reputation in solving problems immediately.

Having adequately trained staff in customer relationships and care is of a paramount importance. Even technical staffs need training in customer service. Confidence in the water sector system does not only rely on how many times the institution encounters problems but it depends on how those problems have been solved and the manner in which they have been communicated to the affected public.

2.13.3 COMMUNICATION

Effective water service providers are expected to have good relationships with citizens. According to Naidoo & Mosdell (2004:59), effective communication is the cornerstone of any successful customer service strategy. The Municipal Systems Act 2000 also stresses the importance of good quality service. The understanding is that quality service demonstrates understanding of customer needs.

Good quality service not only depends on the capacity of officials but also on political and public acceptability. Acceptability depends on the level and quality of participation. Public participation promotes and broadens morality among the public and makes them feel obliged to carry out any decision made. According to Beghdall & Rubin 1993 (in Mathabatha & Naidoo 2004:5), participation is about actively involving people in decisions that affect them. This means only issues that may directly affect people have to be presented for their input, and it has to be presented in a manner that accommodates all levels of people.

While this may be difficult to achieve, if one considers the level of diversity among a community, it is the responsibility of the water sector to create an environment that encourages free dialogue between its officials and community. Open and transparent communication will assist the water sector in developing water management strategies that are informed by the needs and aspirations of the community it serves.

2.13.4 FLEXIBILITY AND CONSIDERATION OF DIVERSITY

Turton (2003:17) states that there is a natural propensity towards complexity which is clearly manifested in water resources management. Turton further suggests that as the result of propensity towards complexity, adaptive institutions are needed. Turton says water sector institutions that do not accommodate multi-domain, multi-actors and complexity of the water subject will not cope.

Water sector institutions have to be structured in a manner that accommodate or reflect the complex and diverse nature of population it serves. The institution's attitudes and perspectives about the population it serves will determine the success of the policy it introduces. The ability of the institution to absorb technology transformation and adopt the complex patterns of water needs will determine the future of these institutions. Issues such as climate change and the spatial, social and economic aspects are some of the factors that a water sector institution has to deal with concurrently with the provision of services.

The organizational structure has to be a complex adaptive structure that adapts itself to ever-changing circumstances, and promotes the interactive implementation that makes it possible for the institution to be flexible enough to cope with uncertainty in water service delivery. This means it is crucial that the policies employed do not create any impression that they promote one culture at the expense of other cultures. Policies used should incorporate the norms and values that are inherent to the formal and informal institutions because of their natural level of cultural acceptance and inherent legitimacy.

2.14 WATER PRICING METHODS

Water pricing can be classified into volumetric and non-volumetric methods. Volumetric methods rely on the quantity of water used and require a metering water facility. Non-volumetric methods are not based on quantity. Water licensing and connection fees are some of tools used for non-volumetric methods.

To promote the efficient use of water resources, water pricing has been introduced and adopted by many countries (Fiander & White 1994 in Hester 2000:18). The methods that have been used accommodate issues such as efficiency, equity, affordability, sustainability and the availability of facilities and technology to support the method.

The methods have to send a clear signal and be clearly understood by officials and customers. Methods can be used in parallel as long as they do not create confusion among targeted groups. To address equity and affordability, life-line pricing structures that rewards low water users and penalise higher water uses have been used by several countries in the world. Life-line pricing has been used to address equity challenges as it allows the poor to have access to water at low or no cost.

The life-line structure used in many parts of the world has reduced water consumption by 10% with the greatest reduction evident from high water users (White, 1994 in Allison, Hester, Kombe & van Druten: 2000:40).

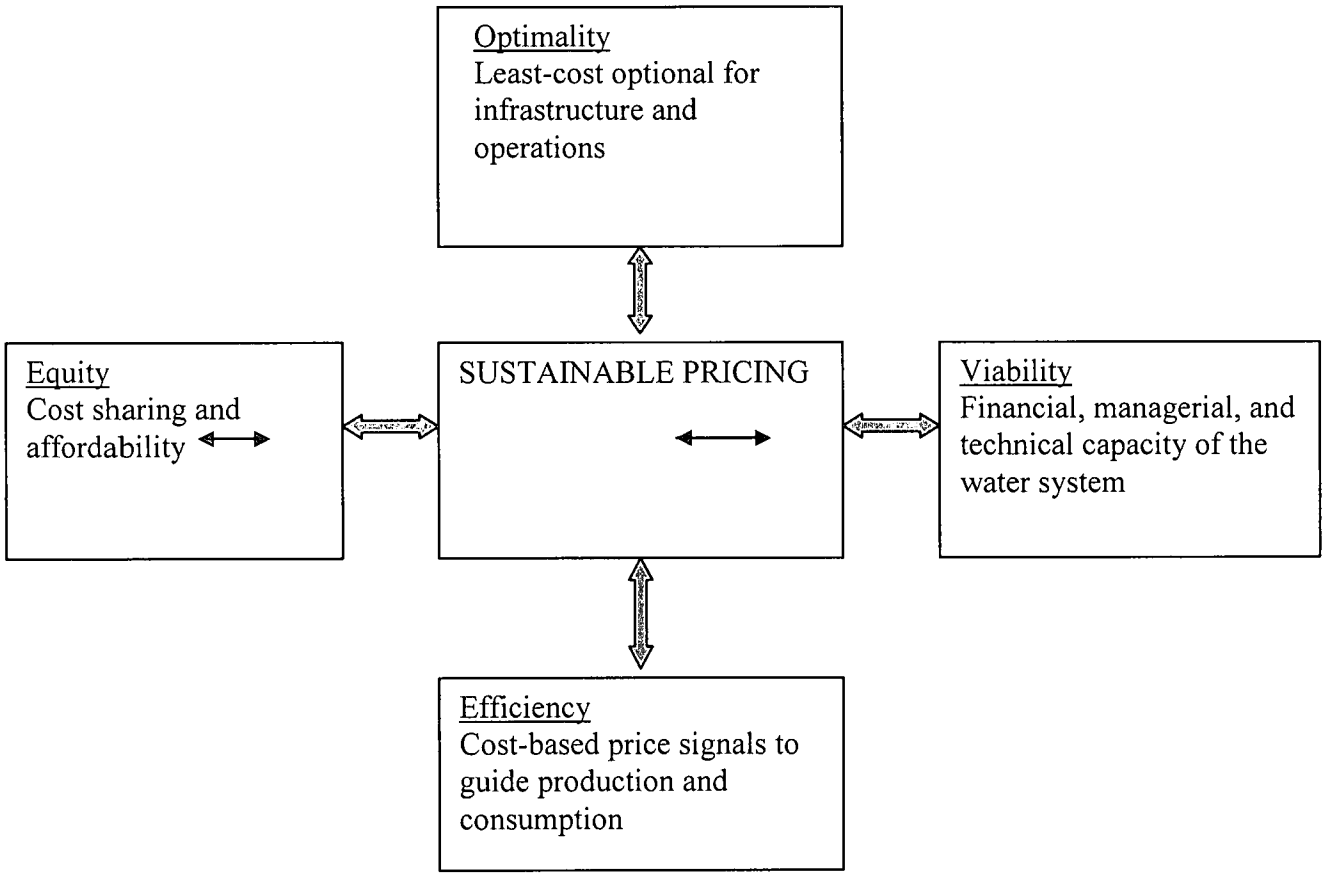
2.14.1 SUSTAINABLE PRICING

The sustainability principle promotes the use of resources in manner that respects the needs of future generations (Tietenberg: 2001:454). Therefore sustainable pricing is about setting a price that reflects the scarcity level of the entity. Water, as scarce natural resource, has to be priced in a manner that aims to achieve efficiency, full cost recovery, economic viability, equity and fairness (Klawitter, 2004:278). According to Klawitter (2004:277), water pricing that is built on sustainable principles influences local socio-economic conditions and promotes better management of urban water resources. The water pricing methods adopted has to eliminate unsustainable water consumption patterns.

Beecher and Shanaghan (2005:26) propose that the sustainable pricing scheme has to:

- Induce efficient water production and consumption behaviours through cost-based prices;
- Promote optimal or least-based solutions to provide safe and reliable water services;
- Address equity considerations, including the ability to pay and the need for cost sharing; and
- Enhance the viability of water in terms of long-term financial, managerial and technical capacity.

Figure 1. Sustainable pricing and related goals



Source: Beecher & Shanaghan 1999:27

2.14.2 EFFICIENCY

Klawitter (2004:278) states that water is a scarce resource in quality and quantity. In terms of water pricing, a sustainable efficient price should promote overall efficiency for society. Price has to seek to retain a balance between supply and demand. Klawitter (2004:279) suggests that the sustainable value of water and full cost should balance each other. Over-pricing and under-pricing may create an unbalanced situation. Under-pricing may put at risk the financial capacity of the institution and induce inefficient consumption. The danger of under-pricing is that it creates a culture of non-payment of services, which addresses affordability in a negative way and may be difficult to overcome in future.

Over-pricing enhances financial capacity in the short term. However, it can be destructive to financial capacity in the long term. It is also creates an environment where services are less affordable which may lead to unnecessary conflict.

To be able to address the issue of over-pricing and under-pricing, a price model has to be developed that ensures financial capacity and promotes effective water usage. The law of demand teaches that price is inversely proportional to demand. However, water demand is not a function of price alone. Household size may sometimes break this law of demand. Big household sizes may not respond, as they should in the case of price increases. However, one has to agree that price is essential to promoting efficient use of water.

Water pricing may also be the best instrument to promote equity. For water pricing to be efficient, it has to be supported by available infrastructure such as the metering of water pipes and a good network system that it makes easy and simple for individual households to access water.

2.14.5 OPTIMALITY

The need for providing water services to residences at a reasonable price whilst maintaining maximum efficiency is the optimum goal of all water service providers. However, the tools and information they use do not always reflect their willingness to

maintain maximum efficiency. Little or none is re-invested on capital facilities and as a result some institutions find themselves using older infrastructure that is unable to cope with the current demands or required standards.

Policy makers tend to avoid stretching beyond usual spatial and temporal boundaries of planning. They rely on the old methods of doing things. Exploring unconventional approaches encourages manipulation of demand and supply through technological and institutional means may produce a better solution (Furumele, 2004:5). The approach encourages the exploration of cost-effective means of restructuring that includes consolidation and rationalization in order to achieve economics of scale.

2.14.5 EQUITY

Equity definition means different things depending whether one looks at it from the point of an economist or a politician's perspective. Economists focus on efficiency. Politicians focus on attaining balance between the well-off and not so well-off in sharing resources. In order to balance the two view points, water pricing has to seek to simultaneously address the issue of efficiency and equity.

Equity and sustainability are sometimes related and are both futuristic. In order to achieve them, one has to discourage the creation of subsides that make future costs and benefits insignificant when compared with present costs and benefits. The principle behind sustainability is to address intergenerational equity by pricing water in an efficient and sustainable manner.

2.14.5 VIABILITY

Viability has to be demonstrated in the guidelines and procedures of a water pricing structure. South Africa has demonstrated viability when it comes to water price guidelines. It is not prescriptive and has been developed in the manner that accommodates the different situations the water providers may find themselves in. For example, it has not defined "satisfactory" at local level as "satisfactory" may be informed by several factors that may be not important to other areas.

Benefit-cost analysis may be the tool to use when a water provider is looking for improving the efficient and effective use of water. Benefit-cost analysis that is based on benefit and the cost to water providers and consumers may share light on how much water may be saved and the amount that it will cost the institution. This will assist in choosing a model that will be flexible enough to satisfy all role players.

2.14.6 THE CURRENT STATUS OF WATER PRICING IN THE REPUBLIC OF SOUTH AFRICA

The main objective that informs water pricing in South Africa is social equity, ecological sustainability, financial sustainability and economic efficiency.

2.14.6.1 ECONOMIC EFFICIENCY

The water pricing structure that has been the adopted in South Africa is the price that promotes efficient allocation and is an opportunity cost. It is based on the principle of user charges which is calculated according to amount used and the cost to deliver that service. According to Water Research Commission Report No. 990/1/03, the principle of cost allocation is guided by the following

- Water resources management activity costs must be allocated to sectors in proportion to volumetric average annual sector use; and
- Registered sectoral water use will take into account the assurance of supply from State and Water Use Authority schemes.

The report further suggests for economic efficiency to be achieved the following has to be taken into account:

- Unit cost per sector will be determined for each Water Management Area (WMA) by dividing budgeted activity costs by the allocatable sectoral use; and
- Unit charges in cents per m^3 for pricing purposes will take into account the subsidies granted.

2.14.6.2 ECOLOGICAL SUSTAINABILITY

To address to issues of ecological sustainability, the South African government took a principled position to encourage water providers to consider the impact on the environment of all development activities taking place at local government level. When it comes to the water sector, they are expected to take into account the impact of extraction of water in the catchment areas. They are also expected to come up with initiatives that will rehabilitate rivers and dams. To cover the cost of maintaining acceptable standards for the human and ecological needs of water, chapter three of National Water Act , 1998 suggest that the institutions involved in the design of water pricing structures have to consider the cost of safe guarding and managing ecological reserves.

2.14.6.3 FINANCIAL SUSTAINABILITY

For the institution to effectively perform its function effectively, it has to be financially stable. In many cases, income is derived from the individuals benefiting from the services. It is therefore important that the institutions that are responsible for water service provision to set prices in the manner that ensures that the costs for providing the services are covered. Under-pricing will not make institutions effective in performing efficient services. The water sector has a responsibility to manage water resources, operations and maintenance of existing infrastructures.

To cover all costs involve in the provision and maintenance of water services, the institutions are encouraged to design or set tariffs that will generate adequate revenues for funding the total cost (Marah, O'Donovan ,Martin & Boberg 2004:2).

2.14.6.4 SOCIAL EQUITY

One of the most important issues about water is affordability, accessibility and fairness for all consumer groups. The South African government has undertaken to see to it that there is a balance between affordability, equity and revenue adequacy. To avoid developing a culture of non-payment for services, government has encouraged

the introduction of a stepped tariff which will assist low income earners who do not meet the criteria for indigent policy requirements to afford water. Emerging farmers have also being subsidized for limited period. The government has also encouraged water service institutions to educate their consumers about tariffs and to monitor consumer feedback.

2.15 TYPES OF WATER PRICING

According to Boland & Whittington in Dinar (2002: 215-35) types of water pricing are define as follows:

2.15.1 FLAT RATE

The flat rate is a fixed payment which is unrelated to the volume of water used. A flat rate can involve the property tax bill. Several literature studies have shown the flat rate system is one of the systems that does not encourage or promote efficient use of water. These studies further suggest that flat rate does not address equity. The low users of water tend to subsidize high users.

2.15.2 VOLUME BASED

The consumer is charged proportional to the amount or volume of water used. There are three main options for the volume based method. These are:

- Linear water charge;
- Uniform volumetric charge; and
- Block based.

The basic requirement for volume based method is the metering of connection or water network.

2.15.3 UNIFORM VOLUMETRIC BASED

Water is billed on the quantity used. From a water demand management perspective, the marginal cost principle is applicable and can be used to send a signal about water conservation.

2.15.4 BLOCK BASED

The block based type of pricing has two methods that are the Decreased Block Tariff (DBT) and Increased Block Tariff (IBT).

2.15.4.1 DECREASE BLOCK TARIFF

In the DBT price system, the consumer faces a high volumetric charge up to specified quality in the block, and then for any water consumed, in addition to the specified amount, the consumer pays the limit of the second block.

2.15.4.2 INCREASE BLOCK TARIFF

In the IBT price system, the consumer faces low volumetric charge price until a specific quantity and then for any water consumed, in addition to that specific quantity, the consumer pays a higher price up to the limit of the second block. The more the consumer uses water, the more s/he pays.

2.15.4.3 SEASONAL WATER PRICING

The charging is higher in certain seasons and lower in other seasons. Normally it is lower in wet and higher in dry seasons.

2.15.4.4 TWO-TARIFF

According to Hester (200:19),the "two-tariff consists of an availability charge and usage charge, where availability charge comprise a set charge while the usage charge is placed on top of this and usually matches the marginal cost of providing the next unit of water to the customer".

2.16 CHALLENGES IN DESIGNING A WATER PRICING STRUCTURE

2.16.4 POLICY ASPECTS

Marginal costing is the guiding principle for South African water pricing. However, in South Africa, there are those who still strongly believe that water has to be a free commodity. Even though this is not a popular view, some municipalities, especially in rural areas and former homelands where water was not metered, are reluctant to allow a new metering system to be adopted.

The adoption of the marginal costing principle by national government has created many challenges at local government level. The prerequisite for the marginal cost principle to be effectively implemented are effective governance structures, political maturity and educated or well-informed consumers. Consumers have to be well informed about the processes involved and the costs of its provision.

The policy for the institution involved in provision of water services should be to continuously inform consumers about changes and developments they intend to introduce. Communication with consumers has to take into account their diversity and educational background. Currently many of these water institutions are managed by engineers, who may not have been exposed to customer care or working with communities. Recent changes have forced direct interaction with communities, which have little understanding about the technical and scientific issues involved in water provision. As a result, the level of communication may not be the same, and it is up to the manager to communicate with the community to make sure that it is effective.

The current challenges which these institutions are facing include human resources and the utilization of relevant and efficient technology. The shortage of multi-skilled professionals is the major challenge in the development and implementation of many good policies.

2.16.2 ADMINISTRATION

Administration can have a positive and negative impact on water pricing. According to Marah et al (2004:79), cost recovery is affected by the ability to encourage payment, convenience and penalties. Marah suggests proper follow up and demonstration of willingness to assist and make the environment conducive for consumers to be able to pay are important. The administration unit has to acknowledge that people have different schedules and many obligations that may prevent them to pay for the services rendered to them. With proper and well trained administration staff, the water services provider may be able to recover costs in a manner that demonstrates respect for their customers. Ideally, all administration employees have to be well trained and motivated. However, several issues like salary package, career development within the institutions and reliance on consultants have created major challenges for water services providers in attracting and retaining their staff. Several literature studies have suggested that many water services providers in South Africa are struggling in performing their duties such as billing, development and implementation of effective and cost effective methods of penalising non-payers.

2.16.3 WELFARE PROGRAMMES

Water is a basic necessity that has to be accessible to all human kind, irrespective of their economic status. Several initiatives have been proposed, with the second most popular approach after the free-for-all approach being water welfare programmes that provide relief to the poor (DWAF 2002:3) . The programmes are about providing water for free to the poor. South Africa has given an undertaking that it is to provide funding for the basic free water programme. However, some water service providers found it is difficult to implement welfare programmes (DWAF 2002:10).

One of the challenges is to choose the most suitable method. Targeting the poor is one of the methods that have been seen as suitable (DWAF 2002:8). However, administrating such programmes is not as simple as many suggest. In seeking to address welfare programmes, some water providers have opted to under-price water. Although the approach benefits the poor, it does not encourage efficient use of water and creates unsustainable water supply systems.

The challenge is to address the needs of the poor without destroying the payment culture. Several literature studies suggest that non-enforcement and unclear demarcation or definition of the poor can be unproductive in the long-run as it develops a culture of non-payment for services and can make it impossible to collect from those people who are accustomed to the non-payment of services.

2.16.4 SUSTAINABILITY SIGNAL

According to terms of economists, environmentalists and sustainability practitioners, water pricing has to send a signal to consumers about the financial, environmental and other costs that their decision to use water imposes on the scarcity of water. Charges should be set at the marginal cost of bringing the additional litre of water to the consumer. The challenge is to design a water pricing structure that respond to the unique condition of that specific place. The other challenge is to have a pricing structure that creates incentives for the poor and rich to use water efficiently without being discriminatory.

2.16.5 ACCEPTABILITY

Intensive research has to be done to measure the affordability level of the targeted population. In many instances, the community's willingness to pay depends on affordability, understanding of the benefit and acceptability. Acceptability of the water price structure by politicians and consumers is one of major milestones for a water service provider. In many cases, the major challenge is to come up with a price structure that will be accepted by all stakeholders and which does not compromise the financial sustainability of the water services provider. A price structure should be easy to explain and conform to the perceptions of fairness and is one of the biggest challenges faced by water service providers.

2.17 APPROPRIATENESS OF ECONOMIC INSTRUMENTS

The appropriateness of an economic instrument has to be determined by how it ensures and promotes use of water in a sustainable manner. Economic instruments need to provide the right level of incentives for water use reduction and efficiency.

Tietenberg (2001:165) suggests efficient pricing requires the use of marginal cost rather than average cost in order to adequately balance demand and supply. However, setting the price in a marginal cost scenario may result in excessive profits. Several literature studies suggest that the increased block tariff can be the best water pricing structure to address the problem of unintentional excessive profits. However, this depends on how the increased block tariff structure has been designed.

The increased block tariff is expected to rise steeply in the second block after the lifeline block. The aim is to penalise high consumers. Balfour et al (2005:12) suggest that the increased block tariff works well when there are easy monitoring mechanisms. They say further that the increased block tariff allows for easy cross-subsidisation with wealthier consumers of water paying more.

The appropriateness of economic instruments may also be measured by their ability to support different economic components of the service mechanism. The economic instruments have to cover costs associated with water production and distribution, where costs are variable and fixed. Variable costs must include the amount of energy used to clean polluted water.

2.18 SUMMARY AND CONCLUSION

This chapter has shown that economic instruments can be an effective tool to influence the behaviour of people and promote efficient use of water resources. Economic instruments, as a set of procedural rules, depend on the effectiveness of the administration and infrastructure of the institution. The chapter has also identified billing, correct reading of water meters, the effective communication and use of technology as key components for many economic instruments that can be used.

It demonstrated that an economic instrument has to be designed and implemented in a contextual, integrated, consultative and holistic manner. In order for the instrument to be efficient, it has to encourage efficient allocation of water resources in the municipality and promote the reduction of water use. The instrument has to seek to maintain the water supply-demand balance by implementing prices that are based on the long-term marginal cost that includes the least-cost sequences of measures. Design and implementation depends on municipal efficiency, in terms of staffing, good

management and control systems and a clear understanding of customer service. This implies consideration of costs such as the cost of water provision and environmental management when one is setting up an economic instrument for water demand management.

The literature study has also highlighted the importance of structuring the economic instrument in a manner that does not cause significant financial hardship to vulnerable customers. The implementation has to demonstrate the understanding that some of the consumers can not easily reduce their water consumption, especially those with big households. It has also been demonstrated that the marginal cost principle, which has been seen as the best principle, has to be backed by a legislative and regulatory framework that creates opportunities for an individual water service provider to apply flexibility. The rationale for preferring the marginal cost principle was that it discourages the inefficient use of water. However, without a legislative framework that provides clear guidelines when dealing with various objectives and considerations of the different interests of parties involved, may make economic instruments ineffective.

It has also been established that efforts have to embrace redistribution, economic efficiency, total cost recovery, equity and fairness. There is also a need for income redistribution so that high users subsidize small users and future generations. The importance of educating customers about water is also clear from the literature. For economic instruments to be effective, they need the support of all affected stakeholders. They should be flexible, responsive, simple and easy to understand.
Management of water demand is complex and needs to be integrated in water policies, as well as the strategic processes of the municipality. Through bylaws, a municipality may demonstrate the level of commitment towards ensuring better balance between efficiency, equity and sustainable use of water. It has been shown that South African water laws encourage or support the use of economic instruments to manage demand for water so that the balance between demand and supply of water resources is maintained. The major challenge is at local government level where laws have to be put into practice.

The next chapter investigates water demand management at local level with Buffalo City as case study.

CHAPTER THREE

INVESTINGATION INTO WATER DEMAND MANAGEMENT AT THE BUFFALO CITY MUNICIPALITY

3.1 INTRODUCTION

It has been demonstrated from the literature study that the community responds positively if they have confidence in the municipality and if the majority of them feel that the service they are provided with is of good quality. It has also been shown that poor revenue collection, enforcement and failure to align the entire municipality with the water demand management strategy are some of the factors that tend to negatively affect the effectiveness of any economic instrument.

This chapter explains the research methodology that was applied and it also focuses at current situation at the Buffalo City municipality. The focus is on the economic instruments the municipality uses to promote efficient use of water resources in their area of jurisdiction. The findings will be analysed and interpreted in terms of its relationship with what the literature study has revealed about economic instruments.

3.2 RESEARCH DESIGN AND METHODOLOGY

The research design is the plan or blueprint according to which data is to be collected to investigate the research hypothesis or the question in the most economical manner (Huysamen, 1996:10). According to Leedy and Ormrod (2001:91), research design "provides the overall structure for the procedures that the researcher conducts. Simply put, research design is planning". The success of research depends on how the research design is tailored to the needs of the researcher as well as to the problem. Mouton (2001:144) has used the following dimensions to discuss research designs;

- Empirical versus non-empirical studies;
- Using primary data vs. analysing or secondary data; and
- The nature of data: numerical vs. textual data.

An empirical study is when one uses reliable data and a valid research instrument to provide information that is useful in reaching conclusions.

A non–empirical study is when one wants to gain insight into the problem or concept to be studied with the aim of generating the hypothesis to be tested. In many cases the aim of the study is to develop new theory that will explain particular phenomena.

The research's main question, (What economic instruments for water demand management are used in the Buffalo City Municipality and how appropriate are they?)was investigated through a qualitative design that consisted of interviews (purposive sample) of Buffalo City Municipality public officials in the Engineering Service & Infrastructure sections. Documentary sources such as Integrated Development Plan-Budget Review, Integrated Development Plan and municipal policies were used. An in-depth literature study as point of departure was sourced from various publications such as journals and previous studies on the subject. An extensive internet search, among others, included Ebscohost, Nexus, Emerald, Google and Ananzi and was conducted to establish the most up–to-date subject matter on economic instruments for water demand management.

3.3 THE RESEARCHER'S ROLE

Qualitative research is not only about data collection; it also promotes a close link between the researcher and the people being researched (Christie 1997). Based on this understanding, a formal procedure for collecting information was developed between the researcher and authorities of Buffalo City Municipality responsible for water services in order to address the question of consistencies and authenticity of sources.

The researcher also recognised the politics present in the Buffalo City. According to Lawrence and Pasternack (1998), natural conflicts always exist between two parties that have different interests or who have different value systems. As a result, the researcher expected to receive distorted information from each group. It was therefore important that the researcher scrutinised all information gathered with an understanding of that limitation.

3.4 ETHICAL CONSIDERATIONS

The privacy of the people involved in the study was protected. The researcher did not falsify collected data

3.5 BRIEF BACKGROUND OF BUFFALO CITY MUNICIPALITY

The areas - King Williams Town, East London, Mdantsane, Rural South and Rural North - were administrated by different systems and have now been amalgamated into one municipality called Buffalo City, a category B municipality. This amalgamation has created some challenges. During the research, it has been discovered that there are large number of properties that exist within the municipality's boundaries that are still not in Buffalo City systems. This has affected the billing system of the municipality. This has led to a billing system that has faults, which led to some properties receiving bills of less than R50 (Buffalo City Municipality, improved payment strategy: undertake an audit of the accounts database final report, March 2004).

According to DWAF, 2001 implementation status report, Buffalo City Municipality's status is as follows;

		Total population served			
Service level	**No. Infrastructure**	**Below RDP**	**At RDP**	**Above RDP**	**Total**
Total	17,177	90,413	126,203	479,559	713,352
Served	0	90,413	126,203	479,559	696,175
%	0.00%	100.00%	100.00%	100.00%	97,59%

		Total poor population served			
Service level	**No. infrastructure**	**Below RDP**	**At RDP**	**Above RDP**	**Total**
Total	5,409	29,382	45,034	160,853	240,678
Served	0	29,382	45,034	160,853	235,269
%	0.00%	100.00%	100.00%	100.00%	97.75%

Table 1: Implementation status report, DWAF: 2001

Data definition

No. Infrastructure – Households that have no access to infrastructure, for example, people that still drink unsafe water from a dam, spring, river or stream.

Below RDP -Households that have access to infrastructure but at a below-RDP standard, for example, standpipe >200m.

At RDP –The infrastructure necessary to supply 25 litres of potable water per person per day supplied within 200 metres of a household and with a minimum flow of 10 litres per minute (in the case of communal water points) or 6000 litres of potable water supplied per formal connection per month (in the case of yard or house connections).

Above RDP - Households that have access to in-house or in-yard water supply connections.

Poor household - Households that have a total income of less than R800 p/m.

Poor population -Total number of people that live in poor households

According to the Buffalo City Municipality Integrated Development Plan Review 2005-2006, (IDP 2005-2006), during the financial years between 2001/02 and 2003/04, Buffalo City Municipality recorded amounts of R120 million, R108 million and R84 million as income for 2003/4, 2002/3 and 2001/2 respectively as income from sales of water. The amounts of R54 million, R52 million and R38 million has been spent on purchasing water for 2003/4, 2002/3 and 2001/2 respectively. Capital expenditure for water projects are recorded as follows:

- For the year ending 2002/3 R13.6 million, R10.5 million below the budgeted figure.
- Capital expenditure for the year ending 2001/02 was R10.3 million actually spent.
- Water and sanitation is number five in Buffalo City priority list, which is based on the September 2004 survey done on 45 wards of the municipality.

3.6 WATER DEMAND MANAGEMENT IN BUFFALO CITY MUNICIPALITY.

The literature study has suggested that water demand involve both the quality and quantity of water. Quality of water can be biggest consumer of water if it is not maintained or monitored properly. Buffalo City uses the polluter-pay principle as a vehicle to maintain water quality under its jurisdiction. However, it relies on surface water as primary sources. It has no control over the areas that this river passes through before reaching its area of control. The work done by East Cape River Healthy Monitors has found that Buffalo River, which is one of the sources for Buffalo City Municipality, is highly polluted in Buffalo City Municipality area. This means there are more polluters in Buffalo City than those outside Buffalo City Municipality jurisdiction. The report lists industry and sewage systems as the major sources for pollution. In order to stem pollution growth, Buffalo City is to charge a levy to those who pollute the water. Some of the institutions around Buffalo City have been forced to build water purification systems in order to minimise their pollution.

The economic activities and position of East London has resulted in Buffalo City Municipality experiencing an increase in the number of people that come from the former Transkei and surrounding rural areas. East London is the second biggest city in the Eastern Cape Province. The rapid population growth has increased the level of demand in the municipality. The expansion of the city has ensured that the city's sewerage systems are operating beyond their design requirements. As a result, water resources are under threat from sewage spills and leakages. Initiatives have been taken to remedy the situation. The amount of R545, 000,000 has been allocated for maintenance of the water and sanitation infrastructure (IDP 2005- 2006). Several official interviews saw water pricing and sewage and pollution charges as the primary economic instruments used by Buffalo City Municipality for water demand management.

3.7 THE ADMINISTRATIVE AND REGULATORY STRUCTURE

Presently Buffalo City Municipality's administration structure responsible for water is under the Directorate: Engineering Services which consists of Water and Sanitation, Roads & Design and Electrical & Mechanical Services. The Water and Sanitation

department is also divided into domestic and sewerage water. The withdrawal of water from catchments and installing of water meters are under the control of the water supply unit.

The Finance Department is responsible for facilitating the implementation of water pricing policy which has been developed by Water Services and Sewerage Water Services departments. Water meter reading, billing and invoicing are the responsibilities of the Finance Department. The Department of Water Services is responsible for reading bulk meters. The Sanitation unit is responsible for sewage management. The Directorate is responsible for setting acceptable standards for pollution and domestic water tariffs. They are instrumental in enforcing pollution control.

3.8 SOCIO-ECONOMIC CONDITIONS OF BUFFALO CITY MUNICIPALITY

The unemployment rate is roughly about 35% and the average household income is estimated at R2, 110 and 48.3 % of the population has a monthly income of below R1, 000 and approximately 60.2% have a monthly income of below R1, 500. Out of the 60.2 %, approximately 66% of these household earn between R0 and R500. The municipality contributes about 24, 07 % of the Eastern Cape's Gross Geographic Product (GGP) with 28% of GGP coming from the manufacturing sector. Approximately 33.54 % of employed people are in the manufacturing sector. (Buffalo City Water Service Development Plan 2003). The majority of the people reside in Mdantsane, Potsdam, Zwelitsha and Dimbaza.

Water consumption in the Buffalo City Municipality increased due to high population growth, urbanization and the rise of living standards. Recent water plans assumed that water will be adequate for meeting anticipated raw water demand until 2012.

The projected demand for Buffalo Regional Schemes for 2005 equates to 70.9x $10^6 m^3/a$ for high demand scenario and 45.6 x10^6 m^3/a for low demand scenario.

3.9 WATER PRICING METHODS

The water pricing method is a mixture of flat rates and Increased Block Tariff (IBT). During the research period, the municipality was in a process of introducing the increased block system to all areas that have been using flat rate systems. The IBT for domestic water is as follows:

Table2

Water tariff	**2004/05 R/cents**	**2005/06 R/cents**	**% increase**	**%increase per block**
0-6kl (indigent)	Free	Free		
0-6kl(non-indigent)	4.15	4.23	1.93	
7-10kl	4.15	4.31	3.86	1.90
11-20kl	5.65	5.99	6.02	38.98
21-30kl	7.33	7.77	6.00	29.72
31- +kl	9.19	9.75	6.10	25.48

Source: Buffalo City Municipality tariff structure 2005- 2006

Bulk supply, communal standpipes are charged a flat rate. The first time consumer is expected to pay a deposit upfront to the municipality, which serves as a security payment for water charges.

Needy consumers are catered for through the introduction of an indigent policy which caters for those with incomes between R0 and R1, 500 per month. They receive 6kl of free water. This policy has been operating for more than a year. During the research, few people have registered to quality for a free allocation in comparison to the socio-economic profile of Buffalo City Municipality.

The tariff study, done by Buffalo City Municipality, shows the majority of people in Buffalo City Municipality are prepared to pay between R20.00 to R105.50 for water. This equates to between 5kl to 20kl of water.

During the dry season, domestic sprinklers are banned and sport fields are restricted to watering twice a week. Any member of community found guilty of malicious damage of his/her water meter is charged the amount of R375. 00.

The charge on the quantity of water used is based on the average consumption of the previous three months. The payment of water services is required within 21 days. Failure to pay within 21 days means the supply may be disconnected. The amount of R375.00 is payable for reconnection.

3.10 THE RATIONALE FOR USING INCLINE BLOCK TARIFF

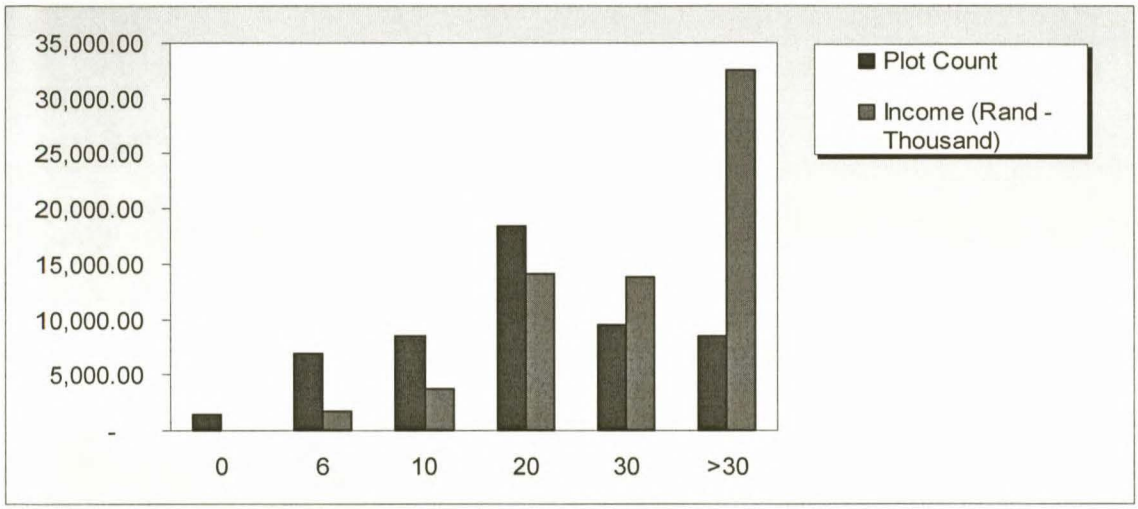


Table 3 - Tariff proposal- F2005/06 Sources: Alistair Hofert, March 2005

According to the table 3, efficiency in water pricing, economically speaking, starts at block 30, and the assumption is the price is at marginal cost. Below block 30, the price is not set at marginal cost, and it appears ineffective in reducing water demand. The main objective at block 0kl to 20kl is about addressing accessibility and fairness rather than promoting efficient use of water. It is therefore correct to suggest that at level 0kl to 20 kl, the priority is to make water affordable to all. At level 30kl and above, the aim is to attract the required revenue in order to meet the cost of production. Therefore, the full-cost pricing of water is only applicable to 30kl and above.

The philosophy of shielding the poor and maximising the revenue is the guiding principle for the tariff structure used. This means the primary functions of water

pricing is the efficient allocation of water supply and equity among the users. The graph demonstrates the intention to move away from using 2004/5 year figures to the accurate setting of tariffs that maximise revenue. The basic aim of the move is to set the price of water at current replacement costs, rather than at average historic costs.

Rates charged to Buffalo City Municipality water users generally seek to balance cost recovery and water conservation. Water rates have increased by roughly 16.52 % for industrial supply and 6% for domestic from the 2004/5 year.

The water tariffs reflect the increasing cost of water and the increase from block four to block six which is higher than the rate of inflation and seeks to accommodate overhead costs which contribute directly to water supply but are essential.

The implementation of the indigent policy and the cost of water in the first block provide lifeline rates for low income users and yet promote the culture of payment and development and growth issues. These demonstrate the understanding of the importance of advancing social policy in the community while at the same time developing a culture of payment for service rendered to them.

Due to an intensive consultation and education campaign, Buffalo City Municipality has experienced less resistance to water price increases. The major resistance has been experienced in areas where there were no water meters. The introduction of pre-paid meters in some areas has been slow due to some resistance which has been addressed.

Water rate increases are a highly contentious issue in any community. However, Buffalo City has taken a bold step of increasing water prices during election year. This demonstrates independence of water services from political activities, the maturity of political officials and how community participation can contribute to running of the local government.

3.11 ENFORCEMENT OF WATER CONSERVATION

Buffalo City Municipality has received water meters form the Department of Water Affairs and Forestry. During the research, they were in the process of installing meters to all areas under their jurisdiction and the consultant firm that was contracted by the municipality was in a process of educating people about tariff structures and the importance of paying for water. Several areas such as Duncan Village had already agreed to the implementation of new systems. Pamphlets and the municipality newspaper are some of the tools that were used to educate the community about water conservation.

3.12 SUMMARY AND CONCLUSION

This chapter has shed light on some initiatives by Buffalo City Municipality to address water related challenges. It has also demonstrated that the current supply infrastructure is inadequate to meet the water needs of Buffalo City Municipality. Even though there is sufficient money to improve water services delivery, the provision for water demand has forced the municipality to take into account water demand management measures.

In addition to reviewing of the water pricing structure, several education campaigns are been applied through out the Buffalo City Municipality to promote water demand management. The adopted IBT structure has been seen as the best economic instrument for water demand management. To address equity, fixed charges have been scrapped. It has been shown that the municipality is in the process of expanding the consumer base by ensuring that all water networks are metered so that they can easily implement water tariffs. They have introduced a six–stepped rising block structure that is based on increases in price as more water is consumed. Within the water tariff structure, there is cross-subsidisation of low users by large users. The policy to protect the poor is already in place. However, there is sign of weakness in administrating that policy. Jointly with community representatives, they have sold the 2-6% increase in water charges through effective communication and thereby pre-empted possible resistance. It was also shown that there is a need for reviewing the organizational framework, especially the administration and management of billing systems.

Some weaknesses also came to light when it comes to the billing systems and record keeping. Currently, there are households that do not receive bills or some receive wrong bills. The weakness in the billing system makes it difficult to determine the reaction of consumers to the price. This is limited planning on the side of water managers. It also makes it difficult to quantify the savings derived from the introduction of the new tariffs. Analysis of the information from Buffalo City documents reveals a certain degree of promotion of water demand management but there is no comprehensive approach towards water demand management.

The next chapter will focus on evaluating the main trends and patterns observed in terms of the findings from the literature study, as well as to on the systematic reviewing Buffalo City Municipality's tariff policies and principles within the context of water reforms.

CHAPTER FOUR

EVALUATION OF WATER DEMAND MANAGEMENT: BUFFALO CITY MUNICIPALITY

4.1 INTRODUCTION

The focus of this chapter is to evaluate the main trends and patterns observed in terms of the findings from the literature study, as well as to on the systematic reviewing Buffalo City Municipality's tariff policies and principles within the context of water reforms.

4.2 TARIFF STRUCTURE OF BUFFALO CITY MUNICIPALITY

As explained briefly above, water pricing is used as the economic instrument for demand management. Buffalo City Municipality's water demand management strategy entails the structural reform of the water and sanitation tariffs that partially reflect the true cost of providing the services. While this has not transformed the provision of water into a commercially viable stream, there are several elements that reflect the slow transformation of water utility into a commercially-oriented enterprise. Literature studies have suggested that water pricing structures have to adopt the margin cost principle. Looking at the incline block tariffs used by Buffalo City Municipality, one may conclude that high block tariff structure used has been set at marginal cost.

It has been also suggested in literature studies that water must not be under-priced as this promotes the inefficient use of water. The tariff structure that has been adopted demonstrates the intention to provide appropriate incentives to consumers to rationally use water. To avoid price shock, the price has been increased in the lower bands by 2% and in the high bands by 6%. Accessibility and efficiency are some of principles that have been applied by Buffalo City Municipality. However, when one scrutinises the details, the structure does not seems to demonstrate full cost recovery, especially at lower bands.

The major challenges in the tariff system applied involve economic and dynamic inefficiencies due to insufficient administration by the Buffalo City Municipality. Its ineffective billing systems and lack of control systems makes it difficult to measure the effectiveness of the tariff systems used. This also shows that the municipality is not able to determine whether it is operating efficiently. It seems that the municipality currently is unable to cover their entire operation and fixed costs and as a result, there is a strong reliance on loans.

During the period of research, the municipality was in a process of changing sanitation tariffs. According to the literature, the tariff administrative system and procedures has to be transparent and a conflict resolution mechanism should be incorporated into the system. The Buffalo City tariff administrative system requires further transparency so that there is a clear understanding of procedures.

There has been improved metering and cash collection month on month. However, there is more to be done, especially in terms of capturing all properties onto the municipality's database.

The administrative procedures – both in payments and in the collection of water metering - are clearly defined and payment points of services are accessible at convenient time for consumers. The municipality has spelled out the following specifics:

- Charges for installation of metering devices;
- Cycle for meter reading and billing; and
- Penalties should consumers fail to pay for service within stated period as well as charges for vandalising meter.

To address the needs of the poor, an indigent policy has been introduced. However, when compared to statistical data on the socio-economic conditions of the province, one may concludes that the policy is not yet effective. Low numbers of people benefit from the policy, which raises many questions. One of the questions is where are the other people who are suppose to benefit from the policy and how do they survive? The low numbers of people who have registered for the policy may lead to the assumption that the majority of those who are suppose to benefit from it have other ways of getting water at no cost. A second assumption may be they are not well

informed and as result they have developed effective mechanisms to use water or the criteria used make it difficult for them to benefit from the system.

The idea of targeting of poor by means of direct subsidy by the Buffalo City Municipality is in line with suggestion in several literature studies. The targeting of poor instead of using a cross-subsidy scheme has been seen as the most effective approach to address equity.

4.3 APPROPRIATENESS OF THE INSTRUMENT USED

In terms of sustainability, the use of water pricing by Buffalo City Municipality may result in efficient water behaviors by lower and high income earners. However, high income earners, who happen to be high users, may not be affected to the same extent as low income earners. The cost of 19 kilolitres is R157.17 which is 1.57% of the individual earning roughly R10 000 per months which is below the 2% set level.

When it comes to ability to pay, the structure has been designed in the manner that allows low income earners to pay for water services. It is also worth mentioning that the purpose of the price is to rectify individual behavior in terms of water usage. It is therefore an important mechanism to create an environment that makes those who cannot afford high water costs responsible for their actions. One may assume that the water tariff structure has been set to marginal cost, even though one does not have sufficient information to support that position. The assumption is based on the current price which is above inflation rate.

Lack of information and improper billing makes it difficult to find out whether the price structure used by Buffalo Municipality enhances the viability of water in terms of the city's long-term financial, managerial and technical capacity. This also applies in trying to determine what Klawitter (2000) views as balancing the sustainable value of water and full cost. Without sufficient information, it will be difficult to conclude on whether the pricing structure used does meet those requirements.

When it comes to financial sustainability, the current structure assists the water utility to effectively perform its function, provided they improve the billing system. Several initiatives have been introduced to improve the municipality's billing system.

However, some training is required to improve customer care. This is especially applicable to senior technical staff. There are also limitations in proper monitoring and there is a lack of commitment by meter readers which is seen as the limiting factor in the effectiveness of increased block tariff system as outlined by Balfour et al (2005).

4.5 FINDINGS AND EVALUATION

This chapter has considered the complex issues of economic instruments for water demand management applied by Buffalo City Municipality. The economic instruments that have been chosen by Buffalo City Municipality serve many objectives such as equity, efficiency and sustainability and are often inconsistent each other. The economic instrument used for water demand management is water pricing. The chapter has also concluded that the water pricing used can be effective, if proper billing is in place. The assumption is that the current water pricing has been set equal to marginal cost.

The Buffalo City Municipality has started to meter all connections under its jurisdiction in order to effectively implement volumetric charges. The rationale for Buffalo City Municipality' s water tariff structure calls for graded water rates which means charging higher rates for higher consumption. This necessitates that all consumers should be supplied water through meters only. The price fixation is on the basis of a forward looking approach, focusing on expenditures that are actually incurred and the present inflation rate.

The billing system needs improvement. Water bills often do carry information needed to make decisions. They convey information that can assist the consumer to understand consumption during the billing period. The structure of bill (annexure I) is user friendly, showing the marginal price charge for the last and current unit consumed. They also show the charge for each block, which is necessary for making decisions. The information about tariffs is by way of pamphlets which are available at Buffalo City's Customer Care Units.

The non-availability of data on water consumption patterns makes it difficult to estimate the price elasticity. To determine whether the price used is current enough is

not easy as there are many households that are not on the Buffalo City Municipality's database. This means those household are not charged for water. There is also a lack of systematic meter readings. Reading and proper billing are the key components that contribute to the effectiveness of water pricing.

Several officials have suggested that water pricing is the only main economic instrument that can be used and this is attributed to water demand management. The water price used mitigates the municipality's social problem and provides an incentive for efficient use of water by poor and rich.

It can be concluded that Buffalo City Municipality uses water price as the tool for water demand management. The incline block tariff that has been introduced may reduce water demand, provided there are effective enforcement systems in place. The research has also found that the community of Buffalo City Municipality is consulted when new initiatives are introduced, including water. The implementations of the soft options such as consultation and awareness campaigns have delivered clear and visible results.

When it comes to pollution control, it was discovered that Buffalo City Municipality was in the process of introducing a new tariff system that would improve collection of revenue, according to the amount of pollutant. The new tariff will consider the cost of treatment of that pollutant. A sewerage tariff will be introduced that will follow the domestic water tariff structure and be informed by throughput per type of consumer.

The public officials base their decisions on professional and scientific criteria and there are signs that they are experiencing less pressure from politics. The 6% increase of water tariffs in an election year demonstrates the influence and power of the administrators. Even though there is growing interest in water demand management, it appears there is no systematic approach which allows them to address their priorities and maximize the results. The 6% increase cannot be considered heavy for high income households who are high users.

Towards answering the main research question, the view put forward is that the observed institutional capacity and mechanisms does contribute to the ability of the institution to address the water demand management by using water pricing as the

economic instrument. However, if one looks at the impact on consumers, it may be more useful to go beyond the institutions responsible for water services in Buffalo City.

4.6 SUMMARY AND CONCLUSION

It can be concluded that Buffalo City Municipality uses water pricing as economic instrument for water demand management. Several assumptions have been made that suggest that the tariff structure used has managed to balance many conflicting objectives which include financial sustainability, equity efficiency and affordability. However, it has also been suggested that the benefit of these tariff structure many not be easily quantified due to weakness in billing systems, which includes poor meter reading and the absenteeism of meter readers experienced by Buffalo City. The overall picture is that the increased block tariff used by Buffalo City Municipality is appropriate for water demand management, provided they can improve on administration of the municipality. The final chapter will offer some recommendations on the way forward.

CHAPTER FIVE

SUMMARY & RECOMMADATIONS

5.1 INTRODUCTION

In this final chapter, a summary of this research project is presented as well as recommendations for improving the success of the water tariff structures used by Buffalo City Municipality.

5.2 THE SCARCITY OF WATER AND THE PARADIGM SHIFT TO WATER DEMAND MANAGEMENT

The inherent desire to satisfy human basic needs and enhance human material well-being has, directly and indirectly, given rise to a situation where demand of water resources outstrips its availability. A new way of managing water, as a result of water scarcity, has been introduced. Water demand management (WDM) initiatives, aimed at developing how water demand may be met without increasing supply systems, has been seen as the best option. This may reflect a paradigm shift - from reliance of supply-side management to demand-side management. Several factors, such as the legislative framework, education, economical and technical instruments, have been suggested as important tools to create a suitable environment for water demand management. The paradigm shift to water demand management is informed by the understanding of the needs of a growing population and careful management of water resources.

The new approach of water management aims to promote sustainable use of water by encouraging stakeholder participation in water management at the local level. It is informed by the belief that WDM should be successful, if localised in a way that responds to the local situation. Local government is seen as the institution that should drive WDM through consultation with the local community. WDM is seen as a tool that can address equity and sustainability, if correctly implemented.

Buffalo City Municipality has experienced population and economic growth which has resulted in an increased demand for water. In order to address this challenge, the Buffalo City Municipality is expected to develop effective water conservation

programmes. These programmes should accommodate the different users of water. To do that, Buffalo City Municipality will need to develop instruments that can assist it in achieving sustainable water use. One option is economic instruments. There is a belief that if the instruments are effective, it will encourage the efficient use of water resources which will result in equitable share of water resources by different users.

Due to broadness of water demand management, the study has only focused on economic instruments used in demand management, so that it can be determined whether it does have impact in reducing water demand.

5.3 THE USE OF ECONOMIC INSTRUMENTS IN WATER DEMAND MANAGEMENT

Water demand management is a process that improves efficiency and the sustainable use of water. Water demand management is as a result of an ever-increasing population and general economic development which resulted in increased stress on water resources. An economic instrument such as water pricing is seen as a tool that may reduce the demand of water. This may be done by setting the price of water at marginal cost.

Familiar water demand management models such as water evaluation and planning, integrated resources planning and the economic analysis model have been used to cap the use of water. Depending on the objective of local government, these models may be used interchangeably. Availability of proper information, expertise, funding and community education are keys to making any WDM model successful. Strategies such as the recognition of informal water management institutions and the development of human resources capacity are some of the strategies that are recommended in order for WDM to be effective or to address constraints that might hinder the implementation of WDM programmes.

Several legislative reforms have demonstrated commitment from South Africa's national government. These reforms promote cost recovery of the services rendered to communities. Water is now seen as an economic good. However, the poor are always protected. Several initiatives such as welfare programmes have been introduced in order to protect the poor's access to water.

Regional consensus has been reached to jointly initiating programmes that reduce inefficient use of water. Several institutions such as the Water Boards and Catchment Management Agencies have been established to deal with water management. Water management has been localised in order to allow local communities to partake in decisions that may affect them. There are several water consuming sectors such as agriculture, industry and municipalities that are jointly involved in water demand. Pollution is another major water consumer that requires control. The community is expected to be empowered to be able to manage and control pollution in their areas.

Major challenges exist in the design of economic instruments so that they are consistent with the numerous conflicting objectives of water users. Political acceptability, flexibility and the consideration of diversity are some of the factors that have to be considered if one introduces or plans to design economic instruments for water demand management. As water is a political issue, it is crucial that public officials involve communities at the beginning of the process rather than at the end.

Water institutions need to develop their image so that the community is confident of their role. If the community has confidence in the institution, it will allow the institution responsible for water to introduce new initiatives. Continuous communication and sustainable water service delivery are key to developing community's confidence.

The water price, as an instrument for water demand management, is expected to send a clear signal to consumers. Several methods such as volumetric and non-volumetric methods are commonly used throughout the world. When setting the price of water, it is important that it is set at levels that are sustainable. Low or high pricing are not seen as the best way of setting the price. In order for the price to be sustainable, it has to address optimality, equity, efficiency and viability. Several tariffs such as increased block, decreased block and seasonal water pricing may be used.

5.4 THE APPLICATION OF ECONOMIC INSTRUMENTS IN WATER DEMAND MANAGEMENT: THE CASE OF THE BUFFALO CITY MUNICIPALITY

Buffalo City is one of the two biggest cities in Eastern Cape. It is a category B municipality. The Buffalo City Municipality is the result of the amalgamation of different areas. It has a good implementation record for meeting water service delivery targets. Like many developing municipalities, its water systems are experiencing more demand and its infrastructure requires some rehabilitation. In terms of water demand, the municipality currently manages the service to its community. However, there are several administrative challenges. First, cost recovery is unsatisfactory, primarily because some areas were administered differently.

The instrument which the Buffalo City Municipality uses for water demand management is water pricing. The city uses the increased block system and charges reasonable amounts. To protect the poor, the city has an indigent policy. The policy allows the poor to receive free water up to 6Kl per month. The municipality is in the process of installing meters to all water networks so that it is easier to implement the tariff system.

5.5 FINDINGS AND CONCLUSION

Due to the lack of information, it is not easy to clearly state whether the instrument used is appropriate or not. However, if one considers the current increased block system and the amount charged, one can say the instrument may be effective, provided administration is improved and all water consumers, in the jurisdiction, are registered. Customer care training for technical staff is also seen as crucial because those who work in the customer care unit find it difficult to answer technical questions.

5.6 RECOMMEDATIONS

To improve the success of economic instruments in water demand management, the following is suggested:

- Buffalo City has to improve its administrative capacity in order to ensure that personnel are capable and motivated so that service delivery is conducted with more ease.
- Water meter readers must receive training in order to empower them to be able to read and record the quantity of water used accurately. They should also be able to check that the meters are working properly as well as replace them, when required.
- The strategy for improving collection efficiency, which has already been proposed, must be implemented. Buffalo Community Care Centre personnel should be empowered to understand how the economic instruments work and understand the factors that are considered when the designing the tariff. As recommended in Buffalo City's Audit Report, March 2004, a simple computer-based system that assists all municipal staff who is involved in the delivery of water-related services should be used.

5.7 SUGGESTION FOR FUTURE RESEARCH

A possible title form further research could be formulated as *"Investigation costs and benefits of water demand management measures with the aim of developing economic and social criteria for appraising the value of water conservation savings."* The investigation is necessary to determine the possibility of water privatisation in the promotion of water conservation. The assumption is that water conservation means reducing demand, which translates into the reduction of revenue and lower profit.

5.8 SUMMARY

The implementation of water conservation measures, which promotes sustainable water use, depends on various factors. It has been revealed in this chapter that water demands measures such as the use of economic instruments can promote efficient water use. However, economic instruments, in managing water demand, cannot be

seen as the only solution because it is unclear whether their effectiveness can be measured since administrative measures are not in place. This is the case for Buffalo City due to inefficient administration. What also has been said is that, like other water sectors, Buffalo City has moved from supply-side management to demand-side management. Several recommendations have been suggested to Buffalo City. These recommendations may assist the municipality in implementing its policy of water pricing as an economic instrument for water demand management.

Further research may assist the municipality in developing a model that helps determine the savings that the water services sector may make if it implements water conservation measures.

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APPENDIX 1

BUFFALO CITY BILL & TARIFF

DOMESTIC	A
INDUSTRY	B
TARIFF	C-H

MUNICIPALITY

522, East London, 5200
(043) 705 3150
(043) 722 0660

PERSONAL DETAILS

Dr / Rev. / Mr / Ms	
ADDRESS	
ACCOUNT NUMBER	
DATE OF STATEMENT	28/09/2005
DEPOSIT	120.00
LAND VALUATION	13000
IMPROVEMENTS	126450

SERVICE	DATE	OPENING BALANCE	PAYMENT	CHARGE	VAT	INTEREST	ADJUSTMENT	CLOSING BALANCE
	16/09	5.80	5.85-	5.09	0.71	0.05	0.00	5.80
	28/09	248.42	248.42-	200.81	28.11	0.00	0.00	228.92
rates	28/09	418.20	418.20-	413.00	0.00	3.87	0.00	416.87
CC ARR	16/09	4012.10	440.02-	281.93	0.00	0.00	*(3572.08-)	281.93
SE	23/09	172.91	174.29-	150.47	21.06	1.38	0.00	171.53
DE	16/09	0.00	2.00-	0.00	0.00	2.00	0.00	0.00
	16/09	0.00	0.61-	0.00	0.00	0.61	0.00	0.00
	16/09	0.00	0.00	0.00	0.00	1.81	0.00	0.00
	28/09	10.00	10.09-	10.00	0.00	0.09	0.00	10.00
	16/09	0.00	0.52-	0.00	0.00	0.52	0.00	0.00
TOTALS		4867.43	1298.87-	1061.30	49.88	7.39	3572.08-	AMOUNT DUE

VAT REGISTRATION No. 4240193492

TAX INVOICE

1115.05

ARRANGED	HANDED OVER	90 DAYS	60 DAYS	30 DAYS	CURRENT
3290.15	3228.33	0.00	0.00	0.00	1116.86

Kindly tear off and return with payment

ments at: Pick 'n Pay / Shoprite

easypay

REMITTANCE ADVICE

F NO. >>>>>> 9 1611 2011 3822 2

DUE DATE	17/10/2005
AMOUNT DUE	1115.05
ACCOUNT NO.	

TARIFF

WATER	ELECTRICITY
00-06 KL 3.71 R/KL 06-10 KL 3.78 R/KL 10-20 KL 5.26 R/KL 20-30 KL 6.81 R/KL 30+ KL 8.55 R/KL	

WATER METER READINGS

PREVIOUS	PRESENT	CONSUMPTION
10/08 52100,000	07/09 5560,000	35000,
175027		

ELECTRICITY METER READINGS

PREVIOUS	PRESENT	CONSUMPTION

PROPERTY INFORMATION

ERF No.	WARD
STREET ADDRESS	
SUBURB	DALEVIEW
PORTION	0000000000000 AREA
UNIT	220004KWT043620000000000000

DISCONNECTION

The supply of services may be discontinued without further notice if any amount is unpaid after the due date and the deposit may be reviewed simultaneously. Please note that the due date does not apply to any overdue balances.

20113822

0229

SOUTH AFRICA

Permit Mail

P 4010961

VAT LEGISLATION

IF YOU ARE A COMPANY AND HAVE NOT SUPPLIED US WITH YOUR VAT NUMBER, KINDLY DO SO AS A MATTER OF URGENCY.

BUFFALO CITY MUNICIPALITY

522, East London, 5200

MKUYANA L H
P O BOX 1655
KING WILLIAM'S TOWN

20113822 0000111505

DIRECT DEPOSIT / ATM / INTERNET BANKING

FIRST NATIONAL BANK
BRANCH NO: 21-01-21
ACCOUNT NO: 52120178184
YOUR MUNICIPAL A/C NO:
(NB. ONLY THE 8 DIGIT REF NO. IS REQUIRED.)

REF NO. 20113822

BUFFALO CITY MUNICIPALITY

522, East London, 5200
(043) 705 3150
(043) 722 0660

PERSONAL DETAILS

Dr / Rev. / Mr / Ms	
ADDRESS	P O BOX 1421
	EAST LONDON 5200
DEPOSIT	1000.00
IMPROVEMENTS	1699900

ACCOUNT NUMBER	
DATE OF STATEMENT	22/06/2005
LAND VALUATION	121400

TARIFF

WATER	ELECTRICITY
00+ KL 4.96 R/KL	.420100 R/KWH

SOUTH AFRICA
Permit Mail
P 4010961

WATER METER READINGS

PREVIOUS		PRESENT		CONSUMPTION
11/04	1884600,00	10/05	189610,000	115000,
9401029960				

10035547

ELECTRICITY METER READINGS

PREVIOUS		PRESENT		CONSUMPTION
11/04	5100,000	10/05	3510,000	18000000,
E010025990				

PROPERTY INFORMATION

ERF No/	ELM15481	WARD	22
STREET ADDRESS			
SUBURB			
PORTION	0000000000000	AREA	
UNIT	010320ELM154810000000000000		

0229

VAT LEGISLATION
IF YOU ARE A COMPANY AND HAVE NOT SUPPLIED US WITH YOUR VAT NUMBER, KINDLY DO SO AS A MATTER OF URGENCY.

SERVICE	DATE	OPENING BALANCE	PAYMENT	CHARGE	VAT	INTEREST	ADJUSTMENT	CLOSING BALANCE
	22/06	8620.45	8620.45-	7561.80	1058.65	0.00	0.00	8620.45
	22/06	779.55	779.55-	569.85	79.78	0.00	0.00	649.63
	22/06	3005.04	3005.04-	2636.00	369.04	0.00	0.00	3005.04
	22/06	21.00	21.00-	21.00	0.00	0.00	0.00	21.00
TOTALS		12426.04	12426.04-	10788.65	1507.47	0.00	0.00	AMOUNT DUE

VAT REGISTRATION
No. 4240193492

TAX INVOICE

12296.12

BALANCED BROUGHT OVER	90 DAYS	60 DAYS	30 DAYS	CURRENT
0.00	0.00	0.00	0.00	0.00	12296.12

DISCONNECTION

The supply of services may be discontinued without further notice if any amount is unpaid after the due date and the deposit may be reviewed simultaneously. Please note that the due date does not apply to any overdue balances.

Kindly tear off and return with payment

Payments at: Pick 'n Pay / Shoprite

REMITTANCE ADVICE

easypay

NO. >>>>>> 9 1611 1003 5547 1

DUE DATE	07/07/2005
AMOUNT DUE	12296.12
ACCOUNT NO.	

DIRECT DEPOSIT / ATM / INTERNET BANKING

FIRST NATIONAL BANK
BRANCH NO: 21-01-21
ACCOUNT NO: 52120178184
YOUR MUNICIPAL A/C NO:
(NB. ONLY THE 8 DIGIT REF NO. IS REQUIRED.)

REF NO. 10035547

BUFFALO CITY MUNICIPALITY
522, East London, 5200

BORDER TECHNIKON NR
P O BOX 1421
EAST LONDON
5200

10035547 00001229612

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/06 Total (Rounded) R/cents VAT Incl.
2		**WATER TARIFF AND CHARGES**				
		Deposits				
		All consumers under this tariff will be required by the Chief Financial Officer to deposit with him a sum of money as security for payment of any water charges due,or which may become due to the Council. The amounts to be deposited shall be fixed by the Chief Financial Officer, with the minimun of:				
	1.	Domestic	183.60	192.78	0.00	193.00
	2.	Industrial	367.20	385.56	0.00	386.00
	3.	Others	183.60	192.78	0.00	193.00
	4.	Provided further that all commercial and industrial consumers' deposits may be reviewed on an annual basis to ascertain a realistic value of deposit and the consumer called upon to deposit any amount revealed in the review, and that the existing item (3) be numbered to read item (4)				
2.1		**Domestic**				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.6381	3.7109	0.5195	4.23039
		7 - 10 kl	3.6381	3.7836	0.5297	4.31334
		11 - 20 kl Tariff x 10	4.9575	5.2550	0.7357	5.99067
		21 - 30 kl Tariff x 20	6.4264	6.8120	0.9537	7.76569
		31 + kl Tariff x 20	8.0648	8.5487	1.1968	9.74551
2.1.1		Bulk/Industrial Supply	4.9552	5.2029	0.7284	5.93134
2.1.2		Prepayment water - Communal Standpipe Exceeding 6 kl	2.4576	2.5805	0.3613	2.94172
2.1.3		Prepayment meter - Consumers	Block Tariff	Block Tariff		Block Tariff
2.1.4		Metered Fire Connection	4.1948	5.2029	0.7284	5.93131
2.1.5		Unmetered Fire Connection Per Month	49.40	58.33	8.17	66.50

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/06 Total (Rounded) R/cents VAT Incl.
2.1.6		**Punitive Tariffs And Controls When Water Availability Is Scarce**				
2.1.6.1		**Punitive Tariff 1A (By special resolution of Council)**				
	1.	**Domestic**				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.7291	3.8036	0.5325	4.33615
		7 - 10 kl	3.7291	3.8782	0.5430	4.42117
		11 - 20 kl Tariff x 10	5.2054	5.5178	0.7725	6.29026
		21 - 30 kl Tariff x 20	7.0691	7.4932	1.0490	8.54225
		31 + kl Tariff x 20	9.2745	9.8310	1.3763	11.20736
	2.	**Bulk / Commercial / Industrial Supply**	5.6985	5.9834	0.8377	6.82110
	3.	**Schools**	3.5084	3.6838	0.5157	4.19958
	4.	**Sporting Clubs / Churches / Old Age Homes**	3.5084	3.6838	0.5157	4.19958
2.1.6.2		**Punitive tariff 1B**				
		18 - 24 Months storage in sources of Bulk Water				
		Domestic				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.6381	3.7109	0.5195	4.23039
		7 - 10 kl	3.6381	3.7836	0.5297	4.31334
		11 - 20 kl Tariff x 10	4.9575	5.2550	0.7357	5.99067
		21 - 30 kl Tariff x 20	6.4264	6.8120	0.9537	7.76569
		31 + kl Tariff x 20	8.0648	8.5487	1.1968	9.74551
2.1.6.3		**Punitive Tariff 2**				
		12 - 18 Months storage in sources of Bulk Water				
		Domestic				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.6381	3.7109	0.5195	4.23039
		7 - 10 kl	3.6381	3.7836	0.5297	4.31334
		11 - 20 kl Tariff x 10	4.9575	5.2550	0.7357	5.99067
		21 - 30 kl Tariff x 20	6.4264	6.8120	0.9537	7.76569
		31 + kl Tariff x 20	8.0648	8.5487	1.1968	9.74551

E

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/06 Total (Rounded) R/cents VAT Incl.
		RESTRICTIONS				
		Use of all domestic sprinklers is banned. Sportfields restricted to watering Twice a week				
2.1.6.4		**Punitive Tariff 3**				
		9 - 12 Months Storage in sources of Bulk Water				
		Domestic				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.6381	3.7109	0.5195	4.23039
		7 - 10 kl	3.6381	3.7836	0.5297	4.31334
		11 - 20 kl Tariff x 10	4.9575	5.2550	0.7357	5.99067
		21 - 30 kl Tariff x 20	6.4264	6.8120	0.9537	7.76569
		31 + kl Tariff x 20	8.0648	8.5487	1.1968	9.74551
		RESTRICTIONS				
		Use of sprinklers and hosepipes banned - all watering to be done using hand held containers.				
2.1.6.5		**Punitive Tariff 4**				
		6 - 9 Months Storage in sources of Bulk Water				
		Domestic				
		0 - 6 kl (Indigent)	Free	Free		Free
		0 - 6 kl (Non-Indigent)	3.6381	3.7109	0.5195	4.23039
		7 - 10 kl	3.6381	3.7836	0.5297	4.31334
		11 - 20 kl Tariff x 10	4.9575	5.2550	0.7357	5.99067
		21 - 30 kl Tariff x 20	6.4264	6.8120	0.9537	7.76569
		31 + kl Tariff x 20	8.0648	8.5487	1.1968	9.74551
		In addition to the punitive tariffs applicable a fine will be imposed.				
		RESTRICTIONS				
		All watering with potable water banned.				
2.1.6.6		**Less than 6 Months Storage in Dams.**				
		Water rationing in accordance with a Special Resolution of the Council				

F

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/06 Total (Rounded) R/cents VAT Incl.
2.2		**Special Agreements**				
2.2.1		Purified sewerage effluent tariff	0.2233	0.2344	0.0328	0.26726
		Tanker Sales Per Load	409.40	429.87	60.18	490.05
		Schools, Sporting Clubs, Charitable Organisations, Old-Aged homes and Churches				
		Water consumed for normal domestic purposes to be charged for in accordance with the bulk supply rate.	3.0508	3.2033	0.4485	3.65179
		Borehole Water (Kaysers Beach,Kidds Beach,Winterstrand) Plus a Discount				
		Water used exclusively by schools and charitable organisations for swimming bath purposes or by sporting clubs for developing and maintaining sports grounds or by churches, charitable organisations and Old-Aged Homes for agricultural or horticultural purposes to be seperately metered at the consumers expense and charged for at the Bulk Supply rate less a discount	3.0508 10.00%	3.2033 10.00%	0.4485	3.65179 10.00%
2.3		**Building Water**				
		Where water from the mains is required for building works, the owner or builder shall apply on the prescribed form and pay the amounts set out below and any monthly accounts				
		Value of Building works				
		FEES (Standard Connection Fee)	2,155.70	2,263.48	316.89	2,580.37
		DEPOSIT (1/4 % of the total value of building work with a minimum of R450.00)	428.00	449.40	0.00	449.40
		TARIFF (Bulk Supply Rate)	4.9552	5.2029	0.7284	5.93134
		The deposit or balance thereof will be refunded on completion of the work				
2.4		**Special Sales**				
		For special sales of water through a 15mm connection at Municipal standpoints or otherwise,menageries, circuses, shows, etc. a deposit as determined by the Chief Financial Officer and the consumption charge shall be				
		and thereafter for each succeeding kl the charge shall be	Bulk Supply	Bulk Supply		Bulk Supply
		A minimum charge be made for each connection, but any expenditure in excess of this amount shall be borne by the consumer on the basis of actual cost plus	354.50 15.00%	372.23 15.00%	52.11	424.00 15.00%

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/06 Total (Rounded) R/cents VAT Incl.
2.5		**Charges for Connections or Services**				
		The charges for new connections shall be as follows:				
		Water deposits to be paid with connection charges in advance of work being carried out				
		15 mm And 20 mm Domestic And Other Connections				
2.5.1		**New Townships**				
		In townships where water connection leadings have been installed in advance by the developer the following charges will be levied.				
	1.	Installation of one meter complete with stopcock and meter box	827.30	868.67	121.61	990.00
	2.	Installation of two to four meters complete with stopcocks and meter boxes	649.90	682.39	95.54	778.00
	3.	Installation of five or more meters complete with stopcock and meter boxes	591.70	621.29	86.98	708.00
2.5.2		**National and Housing Board Aided Township**				
		Where meter are to be installed connection fees as in (1) above				
2.5.3		**Group Housing Schemes with Private Roads**				
2.5.3.1		Where bulk electricity meter is installed a bulk water meter will be installed unless special application is made for individual water meters to individual title erven				
2.5.3.2		Where a bank individual electricity meters have been installed and the developer has laid internal mains and connection leadings to each property to municipal standards, individual water meters may be installed by the Council. Connection fees as per 1 above will be charged for individual meters installed by the Council The Council will then read these meters and debit the individual title erven owners at the standard tariff rate. It is a precondition that unrestricted access to read the meters at all times is available before individual meters may be installed.				
2.5.4		**Existing Township Areas**				
		New water meter connection leadings, complete with stopcock and meter box, to mains within 15 metres distance from the main measured from the property boundary	2,155.70	2,263.48	316.89	2,580.00
		New water meter connection leadings to main complete with stopcock and meter box in excess of 15 metre distance from the main measured from the property boundary.	2,156.30	2,264.12	316.98	2,581.00
		Per metre in excess of 15 m for 15mm or 20mm dia connection an additional charge per metre. Plus	55.60	58.38	8.17	67.00

Item	Nr.	Service	2004/05 Tariff R/cents Excl VAT	2005/06 Tariff R/cents Excl VAT	2005/06 VAT R/cents 14.00%	2005/0 Total (Round R/cent VAT Inc
2.5.5		**Metered Water Connections 25 mm And Larger**				
	a.	New water connections up to 15m distance from the main measured from the property boundary				
		Normal Metered Connections				
		25mm	2,915.60	3,061.38	428.59	3,490
		40mm	5,312.10	5,577.71	780.88	6,359
		50mm	6,779.10	7,118.06	996.53	8,115
		80mm	11,776.60	12,365.43	1,731.16	14,097
		100mm	15,987.00	16,786.35	2,350.09	19,136.
		150mm	24,772.80	26,011.44	3,641.60	29,653.
		Combination Meters				
		50mm	15,198.40	15,958.32	2,234.16	18,192.(
		80mm	22,052.70	23,155.34	3,241.75	26,397.(
		100mm	30,204.10	31,714.30	4,440.00	36,154.(
		150mm	44,514.50	46,740.23	6,543.63	53,284.(
		Sprinkler Connections				
		100mm (metered)	15,987.00	16,786.35	2,350.09	19,136.0(
		150mm (metered)	24,772.80	26,011.44	3,641.60	29,653.0(
	b.	New water connections in excess of 15m distance from the main measured from the property boundary	2.50%	2.50%		2.50%
		The above charges will be levied plus an additional charge of 2,5 %				
	c.	Subject to prior approval of the Council, connections outside the Buffalo City Municipal area will be subject to a surcharge of 25 %	25.00%	25.00%		25.00%
2.5.6		**Hire of Temporary Metered Standpipe Connections for Contractors**				
		The charges for the installation and removal of a 50mm metered standpipe connection shall be:	2,923.70	3,069.88	429.78	3,500.00
		plus a deposit to be lodged, which is refundable when this service is no longer required.	647.40	679.77	0.00	680.00
2.5.7		**Flow and Pressure Test of Watermain**				
		The fee carrying out of a flow and pressure test at any particular area shall be per test	626.60	657.93	92.11	750.00