

**WATER CONSERVATION AND DEMAND MANAGEMENT:
POLICY IMPLICATIONS AT THE LOCAL LEVEL**

BY

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A minithesis submitted in partial fulfillment of the requirements for the Masters of Arts degree in development studies in the Institute of Development studies, University of the Western Cape.

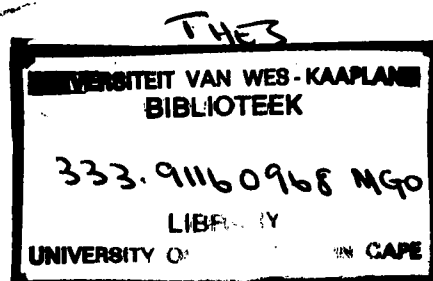
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THIS WORK

IS DEDICATED

TO MY MOTHER AND MY LATE FATHER



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DECLARATION

I declare that “**Water conservation and Demand Management: Policy implications at the local level**” is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

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ABSTRACT

South Africa is currently experiencing the global phenomenon of water shortage. Current water requirements for domestic use, industries and agriculture far exceed local supplies in many parts of the country. It is for this reason that the South African government has to formulate a variety of policies that govern and regulate the use of water.

This study illustrates the present status of South Africa's water resources and current water demand in different regions in the country, particularly within an urban context. This highlights the pressure that is being placed on our limited water resources. It further explores the policy strategy that has been implemented with the objective of ensuring that water is used efficiently in order to balance demand with supply.

Furthermore the study provides a succinct description of the challenges that the South African water industry is experiencing in terms of water delivery. Key elements of the new water restriction policy in South Africa are described. ~~This is done with the view of determining the possible implications of implementing this policy at the local level to different socio-economic strata of domestic water users.~~ In pursuing this line of enquiry, the study identifies a theoretical framework and a set of assumptions, which are then used as interpretive tools in the research.

Within this context, this research firstly investigates the factors that influence water demand and usage, according to three socio-economic groupings in the City of Tygerberg, the case study area selected for this investigation in the Western Cape Province. Furthermore, the study explores the perceptions, attitudes and opinions of ~~three socio-economic groupings~~ (i.e. low, middle and high income groups) in the case study area with regard to water usage, water regulations and water restrictions.

The findings of the study reveal that the socio-economic status of the grouping plays an important role in influencing water demand and usage patterns in the household. In addition, the findings also indicate the main concerns of water users with regard to the water restriction policy. What clearly emerged from the investigation is that there is a strong relationship between agreement in terms of policy measures and the socio-economic status of the grouping. Factors such as the level of education, financial status and customs/lifestyles of respondents play a very significant role in terms of the responses relating to water policy issues.

Finally, the study provides an indication of the policy implications, at the local level, of the existing water restriction policy. From this vantage point, the study provides useful insights that can assist policy makers in designing policies that encourage the conservation of water, whilst promoting and sustaining a higher standard of living. Lastly, the study stresses the need for involvement and participation of local communities in policy making, as well as suggesting a number of interventions that can be adopted by local authorities with the view of enhancing water management in the household and preventing future large-scale restrictions.

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CHAPTER ONE

WHERE DOES ALL THE WATER GO?

"Current approaches to water resources management are unsustainable and are most likely to lead us to crisis and disastrous consequences,"

(Albert, 2000)

The mismanagement and abuse of natural resources, particularly water, continues to be a dominant agenda among national states throughout the world. Summits, symposiums and workshops are held in different corners of the world with the intention of finding means and ways to address the problem of the water crisis. Virtually all nations convert resolutions from these meetings into policy documents that indicate how one should utilize or conserve the world's diminishing water resources. Surprisingly, very few achievements of conserving water are seen to date in comparison to the resources and time that have been spent in formulating water policies.

Water is becoming critically short in many parts of the world. Because of this, proposals to ameliorate water shortages are being mooted in different corners of the world. Looking at a global perspective, in the United States of America plans are underway to divert water southwards to California from rivers as far as western Canada so as to alleviate the water supply problems of the arid southwestern United States. Related to this, is the plan of the officials of the Peoples Republic of China to transfer water 1150 km northwards from the Chang (Yangtze) river to the arid regions around Beijing. Back in Africa, Nigerian engineers are contemplating a scheme to pump water from the Congo (formerly Zaire) River across three countries to refill the drying lake Chad. Furthermore, in Libya, in 1988, Colonel Gaddafi's had an idea of converting the desert into an oasis (Davies & Day, 1988: 10-13).

1.1 BACKGROUND INFORMATION ON WATER MANAGEMENT

Since the early days of civilization, communities have shown a concern for the regulation and management of water resources. Although it is difficult to indicate the exact date when traditional society started to conserve water, there is enough evidence to suggest that traditional society had both mechanisms and regulations to ensure that this resource was available in adequate quantities and of a good quality for their own use and for their animals and plants. In a way, water harvesting, storage of flash floods, construction of dams and drilling of deep boreholes, are some of the earlier techniques that were employed with the ultimate aim of conserving water.

In this regard, Dixey (1931) and Clarke (1991) note that traditional leaders such as chiefs, kings and rainmakers were charged with the responsibility of regulating and managing the use of resources. In principal, the indigenous knowledge of managing and conserving water was passed over from one generation to another by word of mouth. To date this concern is even more relevant with the increase in world populations and associated depletion of the world's natural resources.

1.2 DEPLETION OF GLOBAL WATER RESOURCES

Presently the population pressure, technological advancements and expanding economic activity have placed enormous pressure on global water resources. It is clearly apparent that the water requirement for households, industries and agriculture in many parts of the world far exceeds the local supplies. With regard to water quality, industrial waste and the extensive use of fertilizers is also said to overload the water supplies with dangerous chemicals such as phosphates and nitrates. On the other hand, a poor irrigation practice raises soil salinity and evaporation rates hence greater pressure is placed on water resources (Speidel, Ruedisili & Agnew, 1988; Clarke, 1991; Postel, 1992; Miller, 1996; Postel, 1996; Park, 1997).

Related to the above-mentioned problems is the impact of acid rain and siltation on our water resources. In terms of acid rain, Buchholz (1993:170) notes that acid rain is a man made phenomenon. He argues that when people are burning fossil fuels in power plants, factories, smelting operations and gasoline in automobiles, large quantities of nitrogen oxide, sulfur dioxide and other toxic metals like mercury and cadmium are released into the atmosphere and mix with water vapour. This process eventually causes a chemical reaction which produces dilute solutions of nitric and sulfuric acids. When these solutions fall to the ground, whether in the form of hail, snow, or rain, they contaminate water surfaces. Acid rain is believed to be a threat to both human and aquatic life because it contaminates the water resources from which human and other living organisms draw sustenance.

Turning to the problem of siltation on our water resources, Koch, Cooper & Coetzee (1990:36) argue that siltation from soil erosion is becoming a prominent problem all over South Africa. They maintain that siltation causes the loss of 130 000 000 cubic meters of storage capacity in dams. This loss is equivalent to the holding capacity of medium size dams such as Midmar and Hartebeespoort each year. Although they describe the problem of siltation as a natural phenomenon whereby the topsoil is washed (by erosion agents like rain water) from the land to rivers, they also believe that bad farming practices have aggravated the siltation problem.

Broadly speaking, the high proliferation of the population and its myriad activities not only depletes this most precious resource, but also causes global warming (Feddema, 1999). Irrespective of the ongoing disagreements among scientists on the magnitude and impact of global warming on world climates (Singer, 1997), Feddema (1999) has observed the impact of global warming on climatic changes. He maintains that some areas will experience both an increase in evaporation and precipitation, while other areas will have an increase only in evaporation and not precipitation. As a consequence the soil of these particular areas will be drier, lake levels will drop and rivers will carry less water. Dry locations (e.g. the Sudano-Sahel countries of Mauritania, Mali, Nigeria, Chad,

Kenya, Somalia and parts of South Africa) are predicted to suffer the potential effects of global warming.

With regard to depletion of natural resources, man's quest for food, nutrients and other material energy has also been said to accelerate the clearance of forests and opening up of the virgin land. These two costly exercises, when coupled with the agricultural malpractices and overgrazing, usually intensifies loss of vegetation cover that plays a very important role in protecting our water resources.

In this regard Miller (1996:278) has pinpointed two crucial roles of the vegetation cover on our water resources. Firstly the vegetation cover protects the land surface from being washed away by the run-off to produce soil erosion. Secondly, the vegetation cover facilitates percolation of rainfall water into the ground hence recharging of springs, streams and groundwater for future water use.

The main thrust of this study is to investigate the problems of South Africa's urban water supply and management within the policy framework. Issues pertaining to perceptions that people have about water rights and the related problems of perception are also dealt with in this study. Although this study is urban biased, it does not necessarily mean that the management of water resources in rural areas is of less importance. Essentially, this study highlights the paramount importance of water resource management in South Africa, as water in this country is a scarce resource.

1.3 MANAGEMENT OF SOUTH AFRICA'S URBAN WATER RESOURCES

For social, economic and political reasons, many states throughout the world have been inclined to formulate a variety of policies that govern and regulate the use of water resources so as to ensure that the available water resources meet the water needs of both urban and rural populations, future generations as well as other water user sectors (e.g. agriculture, industries and natural ecosystems).

In this regard, the South African government is no exception in view of the following situations: according to statistics from the South Africa Survey (1999-2000), it is estimated that the South Africa population grew to 43.1m by mid-1999. In terms of the rate of urbanization, it was also revealed that most of the provinces face a serious problem of an increase in the urban populations. For instance, Gauteng Province leads by having 94.6% of its total population staying in the urban areas. And just below that is the Western Cape Province which experiences 89.9% of its population living in urban areas. In principal, most of the South African metropolitan areas are facing the predicament of a relentless rural-urban exodus following the massive movement of people from rural areas to urban areas in search of employment.

This phenomenon has resulted in high population concentration in urban areas, which contribute to exacerbating health problems, particularly for the urban poor. As a result tuberculosis and other infectious diseases are spreading rapidly in crowded, cramped areas and municipal services such as water, sanitation and energy are failing to accommodate new demands.

Moreover, in the earlier years, places like KwaZulu-Natal, some parts of the Eastern Cape and certain sections of the Orange Free State, have been reported to have experienced acute water shortages due to drought to such an extent that water had to be trucked in by tankers (Davies & Day, 1988).

Basically, South Africa's urban water supply suffers from the following problems:- rapid urbanization which in turn increases water consumption, limited storage facilities, limited prospects of identifying and opening up a new storage facility due to the high costs involved in putting up the new infrastructure, water losses, leakages, drought and high levels of evaporation (South Africa Water Bulletin, 1996).

Faced with the above challenge and within the framework of the Water Services Act 108 of 1997, water service providers, from all nine provinces of South Africa, were given the task of formulating guidelines that regulate the use of water. Although these guidelines differ from one province to another, they all possess the following building blocks: social equity, financial viability and environmental sustainability. In practice, each water

service provider in its area of jurisdiction has a constitutional mandate of setting up the water tariffs, which are in line with the above-mentioned principles.

Using an urban area as example, which is also the study area for this research (i.e. City of Tygerberg), the following range of policy options have been implemented with the intended objective of ensuring that water is used efficiently:

- The five-block water tariff structure (see Table 1-1) was introduced to improve equity for the low-income groups, whilst improving water demand management for the higher income groups. In other words the higher tariff will force the consumer to use less water while the extra income from the “luxury consumers” will be used to subsidize the lower income consumers. Of importance in this particular tariff structure is that any household that is going to use more than 30kl/month will be charged a higher price for the next volume and so on.

Table 1.1: The five-block water tariff structure

S/N	Amount of water used	Tariff per kiloliter
1	0-----6kl	R 1.085
2	7-----30kl	R 1.85
3	31-----50kl	R 2.35
4	51-----80kl	R 3.05
5	81+ kl	R 3.90

Source: City of Tygerberg booklet of uniform system for property rates and services charges (July 2000).

- Meters were installed for consumers so as to inform consumers of the amount owed to the water service provider.
- A flat rate system was also introduced. However in the course of implementation, the system proved not to be very successful simply because some people abuse the system.
- Special meters were installed in certain areas so as to measure the night flow of water as well as to regulate the pressure of water during off-peak hours.

In principle this type of measure was introduced to detect water losses at predetermined zones and prove the actual night flow in the system.

With special reflection to the measures outlined above, it is clear that a wide range of regulations on water use has been employed and the new measures have been enforced. Nevertheless, the problem of the water demand outstripping the supply and the low compliance of regulations continue to be top priority on the agenda of water resource planners.

1.4 THE RESEARCH PROBLEM

The current water crisis is a social, economic and political problem of global dimensions. With special reference to South Africa's urban water supply and demand (the focus of this study), the water demand is rapidly outstripping the capacity of the existing infrastructure and as a result the country is confronted with the dilemma of a water demand, which will fast exceed the water supply. Surrounding this dilemma is the fact that water is indispensable for domestic, agricultural, and industrial use.

Statistics from the Department of Water Affairs and Forestry (1999) reveals that irrigation schemes consume 50% of total water use in South Africa. Within the irrigation process, lots of water losses are encountered. The DWAF estimates that not more than 60% of the water that is extracted from the water sources reaches the root systems and plants. Furthermore, water losses in many urban black townships are estimated at 50% of the total supply of water in townships.

But what is even more disturbing is the fact that South Africa is a semi-arid country and its current water demand in certain areas exceeds water availability. It is believed that if the current water demand is not curbed adequately by means of water restrictions, the country might run dry. In other words the country will utilize all of its water resources within 30 years as estimated by DWAF early in 1999.

In an effort to illustrate the relationship between the demand for water and population growth in South Africa, Davies & Day (1988:7) maintains that “with the slowest estimated population growth and the smallest demand for water, supplies will no longer be able to meet demand some time between 2020 (use of all surface water) and 2040 (use of surface and ground water).”

With regard to use of water in the Metropolitan area of Cape Town, Davies argues that over one third of the water supplied by Cape Town City Council is used on gardens just to maintain exotic garden plants. He also notes, with reference to water usage within the home, that bathing consumes 20%, laundry and dishwashing 13%, only 3% is used for drinking and cooking, while 29% (purified water) is flushed down the lavatory.

Within an urban context, and using the City of Tygerberg as the research study area, the water consumption statistics of the city shows that during the 1999/2000 financial years, the city used 85,000,000 KL of water to meet the needs of the city's population, which grows at an annual rate of 3%. Furthermore, these statistics indicate that the city will require 87,550,000 KL for the next financial year in order to meet all of the water needs of its population. From the above, it is apparent that the City of Tygerberg will need to supply about 2,555,000 KL of extra water to meet all the water needs of its population, although it is doubtful whether the City has the capacity to do so. Water service officials from the City of Tygerberg acknowledge that this demand needs a solid monitoring mechanism. According to them, the possibilities of getting the additional 2,555,000 KL from the bulk water services provider (i.e. Cape Metropolitan Council) were appearing to be very remote because the dams supplying Cape Town were 14% lower than they used to be in the previous years. In addition, the officials maintained that the existing water resources were built more than twenty years ago with different water demand growth parameters in mind. To date, even when the dams are at full capacity they cannot adequately meet the growing demand of water from various sectors. This is due to the cost involved in the diversification of water supply facilities on the one hand, whilst on the other hand there are also numerous uncertainties in terms of actual availability of water resources.

In a similar vein, the mass populace of South Africa does not have access to safe and clean sources of water supply. In an effort to address the problem of inaccessibility to a good water supply, in November 1994 the Department of Water Affairs and Forestry (DWAFF) prepared the White Paper on Water and Sanitation. This document contains stated intentions of providing a minimum of 25 liters of potable water per person per day within 200m of each home before the end of 2001 (South Africa Survey, 1997-98).

In spite of the ongoing efforts to supply South Africans with water, it appears that all the initiatives, which are geared at conserving water, are inadequate. Ronnie Kasrils, the minister of the Department of Water Affairs and Forestry rings alarm bells by saying that “despite intensive efforts to promote conservation, overall water demand continues to grow” (The Star, 2000). This statement denotes some lines of problems within the water policy.

1. 4.1 Statement of the problem

Building a rainbow nation in the context of South Africa means the formulation of policies that meet the social, economic, material and political aspirations of South Africans in an equitable fashion whilst promoting and maintaining efficient use of resources.

As the country is facing a major water shortage, planners have been compelled to implement demand management policies in order to promote social equity in terms of water provision and to ensure the sustainability of South Africa’s water supply.

The policy of demand management emphasizes equity for all, but what needs to be established is how consumers’ equity in water use is going to be affected by the implementation of water conservation and demand management policy. Secondly, the appropriateness of implementing this particular policy to different socio-economic groups

who reside in urban areas and come from diverse cultural backgrounds also requires attention.

Equity in terms of water services should entail the following: - physical access to sufficient water for survival and basic needs, affordability of water services, access to planning and decision making relating to the services. The implementation of the water conservation and demand management policy automatically affects the above dimensions of equity in water services.

In terms of how culturally appropriate the policy is, South Africa's White paper on Arts, Culture and Heritage (1996) affirms and recognises different cultural expressions as basic human rights. Moreover, the White Paper supports access to cultural expression. By reflecting on the provisions of this particular policy document, within the framework of water conservation and demand management, it becomes clear that certain cultural groups are more likely to be affected by this particular policy in the course of demanding water to fulfil their cultural preferences which could vary from recreational swimming to admiring the scenic beauty of a well watered garden.

Recently, it has become clear that the supply approach, which refers to the identification of new water sources and the construction of new dams, which was used to meet the growing demand of water, is not a solution to water scarcity because in most cases the domestic demand of water continues to outstrip the supply. Currently, the DWAF advocates the demand approach, whereby the efficient use of water is promoted by focusing more on water use restrictions than on meeting the demand.

The above-mentioned demand approach is accompanied by several use restrictions. These include the restriction on the watering of gardens by hosepipe or any other irrigation system to only one hour a day, people with gardens are not allowed to water their gardens between 10am and 4pm, and the washing of vehicles, building walls, windows, and other walkways by the use of hosepipe is also very restricted. With regard to compliance in terms of these restrictions, the DWAF has already made it clear that

those who fail to comply with these restrictions will be given a penalty of R1 000 or imprisoned for six months or both.

It is against the above background that it is not clear whether all the urban water users will be happy with user restrictions, as well as payment of high prices for water due to water restrictions, as this is something that urban water users have never experienced before.

There is no doubt that DWAF is in the process of establishing measures to curb the problem of water scarcity. What needs to be assessed, however, is the degree of acceptability of these water restrictions amongst all categories of domestic water users. It is within this context that the core research question is raised: "What are the socio-economic and political implications of implementing the water conservation and demand management strategy at the local level to different socio-economic strata of domestic water consumers".

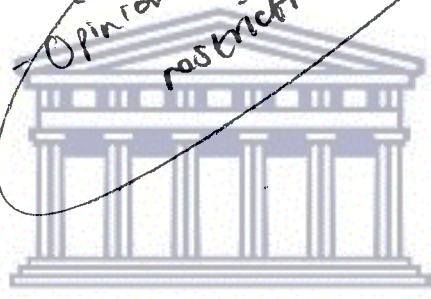
1.4.2 Research theme and conceptualization

The central aim of this study is to investigate additional water policy options that can accommodate the needs of the different socio-economic groups in an equitable fashion. The Constitution of South Africa, by means of the Water Act, provides the water services providers with the powers of regulating the use of water resources. At the same time, the constitution also provides all South African citizens with the right to access and utilization of water. In this respect, it means that efforts that are geared at water resource protection in one way or another must reconcile and blend together the diverse interests of water users, before the introduction of a policy document to govern the use of a resource. For this reason, this study seeks to investigate whether the following realities, that prevail within the minds of water services providers and different socio-economic groups in relation to water use and water rights can influence water policy:

- The low-income class perceives water as a basic right that can be used to infinity. As a consequence the resource is neither respected nor valued in economic terms by this class. Surrounding this perception is the problem of resisting authority, boycotting service charges as well as protesting the enforcement of disconnections of water services. Bakker and Hemson (2000:5) make a case by saying that, “The inevitability of paying is by no means easily accepted in many South African communities who feel they have gained nothing in the new dispensation and yet are expected to pay for services that were previously received as public goods under apartheid”
- The middle-income class perceives water as a basic right, although as a scarce resource, and is concerned about the price of the resource.
- Higher income classes perceive water also as a basic right and the price does not really worry them. In principle, the more affluent sectors of society do not link the real value of the resource to water, because they can afford to pay and wish to maintain a certain standard of living.

Davies & Day (1988:5) describes the relationship between poor people and the environment by maintaining that poor people are naturally worried more about their day-to-day struggles for survival than conservation of the environment of which water is part. Davies notes that the conservation of water is sometimes in direct conflict with the immediate needs of the poor. He goes further by arguing that the poor, particularly the urban poor do not have the conception of, and the feeling of responsibility for resource conservation because they have been so far divorced from a sustaining environment. In this respect the issue of conservation is a very difficult concept to grasp. In terms of more affluent sectors of society, Davies also remarks on the increase in water demand in rich areas due to the fact that water is used in various ways (i.e. for swimming pool, flushing, garden, washing machines etc.).

- how much water usage
- How does various rate influence national issues
- Factors influencing water usage
- Opinions about water conservation
- Opinions about water restrictions
- regulations



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1.4.3 Aim and objectives of the study

The aim of this study is to investigate the attitudes/feelings of three different levels of domestic water users (high, middle, and low income groups) in terms of the implications of the implementation of the overall water conservation and demand management strategy as operationalized at the local level. It is within this context that the more specific objectives of this research will be:

- To examine the problem of water shortage in South Africa and the government response.
- To determine whether the patterns of water usage and demand among the three groups are influenced by the place of residence
- To examine the inevitability of continuous demand for water among the three groups.
- To examine the attitude/belief of the three groups towards water availability and consumption.
- To determine the popular perception of the water conservation and demand management strategy in light of social, economic and political changes in South Africa among the three stratum of affluence;
- To establish the acceptability of the implementation of the various policy and regulatory mechanisms to the various population groupings;
- To provide recommendations and guidelines to policy makers on how to go about making policy.

1.4.4 Significance of the study

This study is of significance at the national level as well as the provincial/local level.

- At the national level, this study will assist the government, as well as agencies and NGO's that are working to conserve water, to get a clear picture of what is actually happening at grass roots level (i.e. in terms of policy acceptability or how

it affects the domestic water users). This will be achieved by exposing the dynamics that are involved in the entire process of reinforcing, adopting and trying to sustain the water conservation and demand management policy.

- At the provincial/local level, the findings of this study will enable the policy makers and implementers to gain a clearer understanding of water users' perceptions at grass roots level and the opportunities, constraints and challenges that they face in adopting the water conservation and demand management strategy.

1.4.5 Basic concepts and terminology

A resource can be defined as any input for man's development process. Miller (1996:12-13) identifies three categories of resources, namely exhaustible resources, which include energy resources such as coal, oil and natural gas. The second category is that of renewable resources, for example solar energy and water. Solar energy is called a renewable resource because it has always been there. The last resource is potentially a renewable resource. This includes all types of resources that can be renewed rapidly (hours to several decades) through natural processes.

Domestic water use refers to water used for normal household purposes, such as food preparation, washing clothes and dishes, bathing, drinking, cooking, flushing- toilets, watering lawns and gardens. This is also called residential water use. This water may be obtained from a public supply or may be self supplied. (Speidel et al 1988).

Depletion refers to the process of intensive extraction or use of natural resources (e.g. land, water or air) to the extent that the availability and quality of the resource in use is reduced and threatened.

Demand management: This is defined by DWAF (1999) as "the adaptation and implementation of strategy (policies and initiatives) by a water institution to influence the

water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability.”

Population pressure is defined as a situation by which a sudden increase in population leads to incredible demand and over-utilization of limited resources.

Progressive water tariff: This term is described as the practice of setting the unit price for a volume of water and higher price for the next volume, and so on. In this respect, the cost of water to consumer increases at an increasing rate and thus the incentive to conserve water increases.

Urbanization: This refers to a process by which more people are living in towns or cities. The term is also used to mean the process of making or becoming urban. Johnston et al; (1986) associates urbanization with the increased concentration of population in towns and cities.

Water conservation: The Department of Water Affairs and Forestry (DWAF, 1999) define this concept as “ The minimization of loss or waste, the preservation, care and protection of water resources and the efficient and effective use of water.”

Water crisis: This term is used to describe a situation whereby the problem of a water shortage has reached such a point that it threatens the availability of enough water to meet the required human needs.

Water tariffs: Can be defined as a charge or list of charges for water services. Water services providers determine these charges by taking into account among other things the operational and maintenance costs.

1.5 OVERVIEW OF THE LITERATURE.

The literature review in this study is done in two ways: the first part of the literature will briefly explore the relationship that exists between service consumption and socio-economic status of the grouping. The intention of reviewing this literature is not to provide an in-depth discussion about the causes of high levels of material or service consumption. Rather, the literature is used as supportive evidence to further develop a general assumption or a guiding principle that will be referred to in the subsequent chapters. The second part of the literature review will focus on the importance of people participation on issues relating to water management. This part of the literature is essentially making an attempt to emphasize the wisdom of public involvement in water management.

1.5.1 Link between consumption and level of income

In coming to grips with the real world problems of consumption, Kate (2000); Lodziak (2000); Mason (2000); Trigg (2001) have noticed that the level of income or affluence of a society or class plays an important role in determining the level of material or service consumption. By focusing attention on the problem of high levels of consumption, Mason (2000) argues that the pursuit of self-esteem and social prestige often generate incredible demand for goods and services in the society. According to Mason, the status of individuals in the modern societies is being conferred on the basis of socially visible consumption, when individuals in the society are constantly busy trying to “keep up with the Joneses”. In our societies, people always want to acquire new consumption goods in order to distinguish themselves from the others.

Given the above facts, this study is making an assumption that there is an association between service consumption and socio-economic status. Put differently, it is hypothesized here that the socio-economic status of the grouping has a bearing on particular water usage practices. Based on this assumption it seems plausible to assume

that the water users will tend to comply to a larger extent with all ideas or policy measures which do not interfere with their preferences or standard of living. These two assumptions serve as guiding principles that will be examined and confirmed respectively in chapters three and four.

1.5.2 Public involvement in water management

A review of the literature on broader development process reveals that the ongoing development debates discourages top down policies that underestimate the potential of the people and their role in the development process (Briant & White, 1982; Burkey, 1993). Current thinking is the philosophy that grassroots support provides valuable insights into local conditions and more importantly results in sustainability and self-reliant development (Chamber, 1997; Carney, 1998). Community participation and involvement in development projects facilitates the implementation of the planning process, reinforces accountability of decision-makers and develops a sense of self-worth, responsibility and empowerment (Oakley, 1991; Penderis, 1996).

In a way, the literature review reveals many experiences, success stories and practical examples of successful policies that are informed by majority decisions. Several broad areas of theory suggest that individual and community actions are necessary ingredients in the resolution and reduction of community problems. The above assertion concurs with the arguments of Michael (1990:198) who states that “a large number of bottom-up locality-based initiatives have been applied, with varying degrees of success in the attempt to resolve the economic, social and environmental problems confronting disadvantaged populations and places within the capitalist city”.

In line with the above assertion and with emphasis on management of water resources, Oudshoorn (1997) warns that water resource planners are very likely to encounter a new and a different kind of scarcity. He believes that water scarcity cannot be solved by engineering measures, but calls for finding an intricate balance between the interests of a number of actors involved. According to him, management of water demand in the

framework of the objectives of national socio-economic development plan poses a challenge in the water planning process. In this respect, he strongly proposes strong mechanisms and political involvement at the national level and a strong social support at the local level. The Population Report of 1998 also notes that most governments depend too much on centralized administration to develop, operate, and maintain water systems. The report maintains that the agencies currently charged with the responsibility of water supplies have already been overextended and lack technical competence. Furthermore the report blames the inability of water projects to meet people's needs due to the fact that most of the projects don't place enough emphasis on stakeholder involvement and community participation in setting water policies.

Burmil, Daniel & Hetherington (1999) also reveal the many-sided human perceptions and values regarding the value of water. They refer to water's life sustaining value as well as the importance of water as one of the most visual elements of the landscape. They argue that current water policies for water management emphasize only technical standards and legal regulations that tend to address relatively few relevant human values, particularly those involving consumptive uses. Burmil et al calls for more comprehensive water policies that address the broader array of human perceptions, meanings and values related to water especially in arid areas.

There are number of examples that can be cited to describe the importance of community participation in water management. In his study of water management in the case study area of Lake Biwa in Japan, Petts (1988) notes that water management has developed through active public cooperation. He argues that the problem of pollution and eutrophication of Lake Biwa was mitigated by community action by means of controlling the waste discharge.

In similar vein McIvor (2000) remarks that community participation is one of the most essential principles in development cooperation. He regards community participation as a process by which people have a say in the conception of projects and accept it as their own effort. McIvor reports on successful participation from a Zimbabwe community

based management water programme in the Zambezi valley. Basing his comments on the benefits of this programme, McIvor makes a plea for other programmes in the field of development and environmental management to adopt the participatory methods that were employed in Zimbabwe. Edwards-Jones (1997) also observes the importance of community participation in water management. When researching the problems facing Scottish fresh waters, he indicated that the participatory integrated catchments plans for the Water of Leith and River Almond revealed a wide variety of benefits that can be derived from an integrated approach to river management.

1.6 DELIMITATION OF THE STUDY AREA

The Cape Metropolitan area is divided into six substructures. However after the election in November 2000, this area fell under the jurisdiction of the new unicity. The study area for this research falls within the Tygerberg Substructure, which covers an area of approximately 430 km², and measures approximately 40 km in a north south direction and has an average width of 11 km (The map of the City of Tygerberg is shown in Appendix II). This area is divided into four zones, each with its own distinctive characteristics:

1.6.1 The physical boundaries of the study area

- **Northern Rural area:** This zone comprises the hilly rural areas in the northern part of the city. The landscape consists of rolling hills and open valleys formed by the Elsieskraal, Diep and Mosselbank River. Wheat farms, vineyards and quarrying comprise the main economic activities;
- **Northern Residential area:** This area consists mainly of low density, higher income residential areas and is defined by the northern urban edge and the N1. The area has an elevated, rolling landscape and accommodates the Tygerberg and the upper reaches of the Kuils River;

- **Central area:** This area includes the medium density, medium to low income residential areas, as well as the bulk of commercial and industrial development, wedged between the N1 and the N2;
- **Southern Coastal area:** This consists mainly of the low income area of Khayelitsha and the False Bay coastline, with medium to higher density living environment which in many cases lacking facilities and basic services. This area, also experiences a high number of informal households.

1.6.2 Social-economic structure

The City of Tygerberg supports a population of approximately 1,2 million (just over a third of the metropolitan population) of which the bulk (450 000) resides in the coastal areas and 285 000 in the central areas. These areas house the poorest sector of the community, with an average household income of R 1400,00 per month in the Coastal area and R 1800,00 in the central area, compared to R 3828,00 for the Northern area (Unpublished report of the City of Tygerberg, 2000).

The City of Tygerberg produces 20% of the Gross Geographical Product of the Cape Metropolitan Area. The largest economic sectors by output are manufacturing (35,7%), trade (19,2%), government (17,9%) and finance (12%). These figures suggest that the City of Tygerberg is largely a manufacturing area with urbanite life. In this case water demand for both domestic and industrial purpose is obviously high.

The total population is expected to grow at an average rate of 2,7% per annum, reaching a figure of 2,3 million by the year 2015. The increased population is expected to generate additional land requirements of approximately 5 000 ha for residential purposes, 150 ha for retail space and 1 000 ha for industrial purposes and 30 ha for office space. In terms of water requirements, the statistics on water use projections indicate that 19,092,165 Kiloliters of water per annum will be required to meet all the domestic water needs of the City of Tygerberg.

These population statistics imply an additional demand on the water resources of the City of Tygerberg. The areas targeted by this study include Durbanville, Belhar and Site C, in Khayelitsha site C. These areas have been selected because the ascribed characteristics (i.e. the size of the property and the value of the property/plot) of the three social economic groupings (i.e. low, medium and higher income earners) that are under investigation are easily traced in these areas.

1.7 RESEARCH METHODOLOGY

Based on the nature of the study, a representative sample was drawn from selected suburbs that fall within the three broad areas of study indicated above.

1.7.1 Sampling strategy

Due to time and financial constraints, the researcher decided to determine in advance a sample size of 90 respondents to be interviewed from the three socio-economic groupings. In a way the sampling strategy decided upon was aimed at selecting an equal number of cases (i.e. 30 respondents) from each of the three socio-economic groupings as represented by the spatial neighborhoods in which they are assembled.

These areas represent various aspects of relatively homogeneous differentiation in status as reflected in: income, plot size, life style, historical conditioning, previous racial and cultural differentiation and local government traditions and practice. This implies that prior stratification of the universe in terms of, for instance, income grouping is not possible and proportional numbers for the distinguishing stratification variable cannot be determined beforehand. It was therefore considered adequate to simply demarcate neighborhoods in the three target areas that are of similar extent in terms of the number of units (900 erven/stands per sub region) to be sampled from. These are numbered sequentially on maps of the region, obtained from the local authority.

A random number generator in Excel was utilized to identify 30 numbers (from each area) to be interviewed. The same numbers in each of the three areas were selected and marked on the maps. The sampling procedure entailed visiting the marked stands and requesting an interview with the head of household. When the selected unit was not available, the next unit was approached.

1.7.2 Data collection instruments

The study used a blend of qualitative and quantitative techniques of data collection. The quantitative mode of inquiry is related to the numerical measurement of selected variables (Neuman, 2000), whereas qualitative methods were employed in order to contextualise the interpretation of statistical data and to obtain more sensitive and socially dynamic information relating to the study (Babbie & Mouton, 1998).

The questionnaire is an important technique utilized in this study in order to solicit relevant information with respect to the respondents' perceptions of the current water policy. Closed ended and open-ended questions were administered to the respondents of this study. The open-ended type of questions were used to allow the researcher to phrase questions that would allow the respondents to express their innermost feelings freely and without fear upon the problem under study (Neuman, 1994).

Interviews were conducted with government officials of the City of Tygerberg Metropolitan Local Council who are directly involved in water provision and policy execution. The interview sessions helped the researcher to capture the views of the (local authority) officials about the problem under study.

Primary and secondary documents from both government and private sources were consulted in order to explore approaches and strategies that are used to tackle the problem of the water crisis. Data was collected with the use of a questionnaire and the heads of the households were required to respond because they are usually responsible for the payment of water accounts.

1.7.3 Methods of data analysis

The collected data was categorized by coding. In this process, the raw data was firstly transformed into numerals to facilitate counting and tabulation of the data. Secondly, the organized data was entered into a computer and simple frequencies were run so as to make sure that all the answers to each question fall within the coding limits. Thirdly, cross-tabulations were performed so as to examine the relationship of variables. Ultimately, the raw data was analyzed by utilizing the SPSS (Statistical Package for Social Sciences) for Windows Microsoft 1998 (Version 9.0). Descriptive statistics were used to communicate the results of the empirical study. In this respect the statistics include actual numbers and percentages.

1.8 THE RESEARCH AGENDA

In Chapter 1, the research problem under study provided the motivation for formulating the research design, research methodology and the aims of the research. The chapter progression for the remainder of the study includes the following sections:

- **Chapter 2** entitled **Global and South African Water Shortages and Policy Responses** places the study in perspective and presents an overview of water shortages worldwide and in South Africa and gives an indication of policy responses;
- **Chapter 3** entitled **Urban Water Demand and Usage by Socio-economic Grouping** seeks to investigate the factors that influence household water demand and usage;
- **Chapter 4** entitled **Water Usage and Water Regulations: Implications of local perceptions** provides an outline of the perceptions of different socio-economic groupings to water regulations;

- **Chapter 5** entitled **Summary, Evaluation and Recommendations** presents a summary of the findings, policy implications and provides recommendations to policy makers.



CHAPTER TWO

GLOBAL AND SOUTH AFRICAN WATER SHORTAGE AND POLICY RESPONSES

The supply and availability of freshwater in the world leaves a lot to be desired. The work of hydrologists and conservationists suggest that many parts of the world will be water stressed in the near future. But what is even more worrying is the fact that people do not realize that water is crucial for survival, for the development of their economy as well as for the protection of the environment. As a result, the majority of people continue to regard water as a natural gift of nature that cannot be depleted. To date, the demand for freshwater is rising rapidly as the population grows and becomes more urban and as water use per capita increases.

This chapter begins by providing a descriptive overview of global water shortages in order to illustrate the dimensions of the water shortage problem. It aims to provide a clear picture of water resources in South Africa in terms of water availability and usage in different regions of the country. Furthermore, this chapter provides a brief account of the challenges that the South African water services industry is experiencing in terms of service provision. The final section describes the South African water policy and the manner in which the policy is communicated down to the lower structures of the government (i.e. local municipalities).

2.1 AN OVERVIEW OF GLOBAL WATER DEMAND AND WATER SCARCITY

Population growth and rising use per capita are at present creating water shortages in many countries. According to the Population Report (Fall, 2000) a country is said to experience water stress when annual water supplies drop below 1 700 cubic meters per person. According to this report, when the water supply drops below 1 000 cubic meters per year; the country will face a water scarcity for all or part of the year.

In 1995, the Population Action International (PAI) embarked on the exercise of calculating water stress and scarcity in countries around the world and updated its findings in 1997 based on population projections for year 2025 and 2050. The 1995 overall results revealed that a total of 31 countries, which house nearly half a billion people, are regularly facing either water stress or water scarcity. PAI estimates for 2025 show that 48 countries, with about 3 billion people will face water shortages. In this regard, the PAI have also noted that about 20 countries of the Middle East and North Africa are facing the worst prospect in terms of water supply owing to the fact that these regions (especially the Middle East) have withdrawn more water from rivers and aquifers than the pace at which water is replenished by nature.

Currently, Jordan and Yemen for example, are said to withdraw 30% more water from ground supplies every year than is replenished (Fall, 2000). In addition, Israel's annual water use exceeds the renewable supply by 15%. Swain, writing specifically on water scarcity in the Arab world argues that "besides the conflict over International river waters, there is also growing tension in the region over the use of underground water" (Swain 1998:2). Swain has noted that Israel is withdrawing more water for its own use from the basin of Jordan. He further states that the situation has already resulted in Israel being at loggerheads with states like Syria, Jordan, and Palestine because of Israel's failure to observe and honor other state's riparian rights of the Jordan River Basin.

In terms of the problem of water resource conflicts in the Middle East, Drake (2000) sees the escalation of the conflict over water issues in this area as a result of multiple factors such as population increase, economical development, rising standards of living, technological development, political fragmentation as well as poor water management.

Competition for water resources is now becoming a global phenomenon. Postel (2000) notes problems and disputes that are emerging in the USA, China and India over the transfer of water from agricultural areas to urban cities and industries. Postel associates the problem of mounting competition for water in the above-mentioned countries as a

result of few supplies to meet the demand for both agriculture and urban life. She believes that the ongoing regional water scarcity and competition will have severe impacts on the global grain trade. Thus she argues that:

At present, 34 countries in Africa, Asia, and the Middle East have per capita runoff levels below 1700 cubic meters a year. All but two of them South Africa and Syria are net importers of grain, and 24 of them already import at least 20% of their grain. Collectively, these water stressed countries import nearly 50,000,000 tons of grains a year. Annual world grain exports total about 200,000,000 tons, so water scarcity is to some degree driving about one fourth of the global grain trade.

(Postel, 2000:7)

Another important dimension to the problem of water scarcity is that it poses numerous health threats to people that are living in the affected area. Plummer (1999), in an effort to unpack the health risks that are associated with water scarcity, carried out a study in the Tanzanian city of Mwanza and discussed the extent to which an inadequate water supply and the use of unpurified water has worsened the hygienic conditions of the people and consequently caused illnesses such as intestinal worms, typhoid, schistosomiasis and cholera. In fact, such illnesses are also reported to have claimed a large number of people's lives.

Plummer (1999) traces the difficulties of obtaining safe and clean water in the Mwanza region alongside the question of burgeoning population and the collapse of water and sewage facilities. The facilities are out of date, in disrepair and not well integrated to meet the needs of the rapidly growing population.

In fact, the Mwanza region is facing water problems to such a degree that her residents are forced to walk half a mile almost every day to fetch water. The amount of water that is fetched is not even enough for minimum family use and usually one has to pay a fee to draw water from a neighborhood tap. In Mwanza it is common to see water vendors who

normally move from one street to another trying to sell water, while in principle it is only the government that is allowed to sell water to the people.

2.2 UNPREDICTABLE AND UNEVEN DISTRIBUTION OF WATER IN SOUTH AFRICA

South Africa is classified as a water scarce country. According to the DWAF (1997) South Africa is on the threshold of the internationally used definition of “water stress” simply because the country already has less water per person than countries widely considered being much drier, such as Namibia and Botswana (i.e. the 42 million people in South Africa have just over 1200Kl of available freshwater per person each year).

In a similar vein, Myers (1996) argues that two thirds of the country receives less than 20 inches (500 millimeters) of rainfall per year, and evapotranspiration is generally greater than precipitation. He notes that there is a limited possibility for farming to support the needs of the fast growing population. Compared with the global average of 800mm, South Africa has an average annual rainfall of only 500mm, which is unevenly distributed both geographically and seasonally. It is generally accepted that 500mm of rainfall is the minimum required amount of rainfall for successful dry-land farming. Moreover, the rainfall is highly variable over time and as a consequence unpredictable and long periods of droughts continue to hit the country fairly often. The high evaporation rate that prevails within many parts of the country implies that much of the rain that does fall is soon transported back into the atmosphere before it can be effectively utilized. South Africa is also poorly endowed with ground water. An estimated 41% of the total mean annual runoff in South Africa is already allocated (Pallet, 1997; DWAF, 1999; McKenzie et al, 1999).

Plans to transfer water from regions that are experiencing a relatively plentiful supply of water (such as Tugela and Umzimvubu Basins) are limited due to the nature of the land and other socio-economic constraints. In line with this is the fact that South Africa’s major river systems such as the Orange, Limpopo, and Komati are shared with

neighboring countries thus making it difficult for a country to take advantage of utilizing the available water resources at the expense of other countries due to the prevailing bylaws. On the other hand, the options of exploiting unconventional sources of water such as desalination, melting of icebergs, which may relieve the water stress, are equally expensive (DWAF, 1999).

Facing critical water shortages and the inevitability of increasing drought, South Africa had to start contemplating possible water transfer schemes and at the same time embark on the construction of several dams within the country to augment the water supply. Recently, a very big scheme to transfer water from the upper Orange River was completed and water is already being transferred. This scheme is called the Lesotho Highlands Water Project of which the huge Katse Dam forms part. *

According to the Burger & Feris (2000), there are several projects concerned with the construction of new dams in different parts of South Africa that are currently envisaged by the Department of Water Affairs and Forestry to augment water supply. Although the idea of constructing new dams to boost water supply sounds encouraging, Davies & Day (1988) and Coetzee (1994) warn that huge socio-economical costs are always incurred in the whole process of constructing new dams. According to Davies & Day (1988), countries spend enormous amounts of money in the construction of dams. In addition, it is estimated that more than 65 million people world-wide, often the politically weak minority, have been forcibly removed from their place of domicile as a result of dam construction.

However, the costs of building new dams are always recovered by means of increased tariffs to water consumers, hence more burden to consumers. Here in South Africa, for example in the City of Cape Town in October 2001, the dams that are providing the city with water were 14% below the levels they should be. This is very worrying because it automatically places the residents of Cape Town at risk of paying higher water tariffs if the current water demand pattern continues to grow. An enormous amount of money will be needed to construct a new dam (i.e. Skuifraam) and obviously, by the simple logic of

cost recovery, this amount of money will be borne by the water consumers at the end of the day (Cape Times Wall Chart, November 2000).

Clearly, the predicament of insufficient or unpredictable water supply and the relentless search for water resource security in South Africa has resulted in the country being inclined to obtain water resources from the neighboring countries of Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zimbabwe so as to achieve its water needs (Pallet, 1997; DWAF, 1999).

2.3 OVERVIEW OF WATER RESOURCES IN SOUTH AFRICA

Table 2.1, illustrated below, provides an indication of water availability and the amount of water that is actually used in different regions of the country.

Table 2.1: Water availability and water demand

REGION	WATER AVAILABILITY	WATER DEMAND	Balance
Northern region	2566 x 10 ⁶ M ³ /a	3373 x 10 ⁶ M ³ /a	- 807 x 10 ⁶ M ³ /a
Central region	1789 x 10 ⁶ M ³ /a	2029 x 10 ⁶ M ³ /a	-240 x 10 ⁶ M ³ /a
Karoo region	6014 x 10 ⁶ M ³ /a	2555 x 10 ⁶ M ³ /a	3459 x 10 ⁶ M ³ /a
South western region	3095 x 10 ⁶ M ³ /a	2396 x 10 ⁶ M ³ /a	699 x 10 ⁶ M ³ /a
Eastern inland region	4834 x 10 ⁶ M ³ /a	2320 x 10 ⁶ M ³ /a	2514 x 10 ⁶ M ³ /a
Eastern coastal region	13199 x 10 ⁶ M ³ /a	5604 x 10 ⁶ M ³ /a	7595 x 10 ⁶ M ³ /a
Southern coastal region	1793 x 10 ⁶ M ³ /a	1768 x 10 ⁶ M ³ /a	25 x 10 ⁶ M ³ /a
Total	33290 x 10⁶M³/a	20045 x 10⁶M³/a	13245 x 10⁶M³/a

limpopo

Source: DWAF poster of water in South Africa (2000)

A mere glance at these figures may easily mislead one to presume that there is more water in South Africa than what is actually needed. In fact the above figures (particularly

the figures for water availability) represents the sum total of both surface water and potential groundwater that is available per annum. Because of the difficulties involved in the process of calculating the exact amount of groundwater, hydrologists prefer to describe only the amount of water that can easily be mined as potential groundwater. It is for this reason that issues pertaining to water demand and water availability need to be addressed with care.

The table confirms that in the Northern and Central regions more water is used than what is available (This is indicated by the water balance figures that appear in the last column of the table). Pumping water from other catchments, which have more available water, normally solves water problems in these two regions. In South Africa most of the catchment's areas that have more water are on the eastern side of the country. Water experts associate the problem of water scarcity in the Central region with high evaporation rates due to high temperatures and dry air. Moreover, they have noted that rapid urbanization, industrial and economic growth have also contributed to an increase in water use.

Another region that is at risk of running out of water is the Southern coastal region, where use and demand is almost in balance. Although other regions have not yet started to experience water shortages, it may be wise for these regions to use water resources more cautiously, because in the future people will need more water for domestic and urban use. This is simply because the population is growing faster and more and more people prefer to move and live in the cities. In addition, people's standards of living are also increasing tremendously.

2.4 WATER DELIVERY IN SOUTH AFRICA

Immediately after 1994, the delivery of basic services such as water and electricity became one of the utmost priorities of the newly democratically elected government of South Africa. During this time the Reconstruction and Development Program (RDP) was launched to handle all matters pertaining to basic services delivery throughout the

country. In terms of water provision, the RDP set targets that all South Africans would have access to at least basic water supply and sanitation services within seven years of the start of the programme, i.e. by the end of 2001 (Pallet, 1997). From the beginning, the main focus of RDP was in the rural areas where the poorest of the poor live.

Although it is difficult to establish in simple terms the impacts as well as the magnitude of all projects that were commissioned to supply water, there is also enough evidence that reveals the extent to which some of the projects were failures in terms of delivering water services to the rural communities. In relation to this argument, Hemson, (2000) stresses the fact that an acute budgetary constraint within DWAF is hampering water delivery. According to Hemson, water supply projects were often rescheduled, wasting funds, confusing practitioners, and disillusioning communities.

In the recent past, officials of DWAF have been issuing statements pertaining to the actual magnitude of water delivery efforts despite the fact that most of the water delivery statistics tend to contradict each other. In this regard, Hemson (2000) argues that it is almost impossible to assess the extent of water delivery from the statements made by DWAF.

Apparently, in both urban and rural areas, it is becoming increasingly clear that the RDP promise of overcoming the backlog in water services particularly in the rural area within a period of seven-years is unattainable. Although budgetary constraints are always a limiting factor in water delivery, there are currently also serious contradictions in policy. With special reflection to water provision, the policy recognizes water as a public service that needs to be provided to people for their health and well being of the community at large. On the other hand, water is provided as a commodity that needs to be priced at full cost because government has limited funds available for water supply. On these grounds, it means then that the country's macroeconomic policy i.e. Growth, Employment, and Redistribution (GEAR) which always insists on Government services to recover costs and privatize delivery of many services and financial austerity, is working totally against the government promises of 6 kiloliters per month of free water for all South Africans.

By focusing on the recent spread of the cholera epidemic in Kwazulu Natal, Hemson (2000) associates the spread of the epidemic with the disconnection of water by the Local Authority to the rural community of Ngwelezane (KwaZulu-Natal) from a supply of clean water for not paying a connection charge. During this particular period of time, community members who could not pay for water were left with no other option but to draw water from the infected Mhlatuze River and boreholes.

The disconnection of water services became effective from the beginning of August 2000 and the first case of cholera was diagnosed and confirmed on 19 August (Salgado, 2000 cited in Hemson, 2000). Despite the fact that the water supplies were reconnected later on, the cholera endemic started also to spread briskly and threatens to move beyond the borders of KwaZulu-Natal. In an attempt to describe exactly what happens when the poor have to pay for water and other essential services, Schlemmer notes that:

“The 40% of the country’s poor are getting poorer. People are making trade-offs. If they are paying for water, they do not pay for electricity or telephones. What we do not know is what else they are trading off. Child nutrition may be undermined as poor people are forced to make choices over the allocation of inadequate resources”.

(Cited in Hemson, 2000:51)

The above assertion suggests that the poor continue to be victims of even the policies that were initially targeted to assist them. By extending this argument a little further it can also be argued that the promises that were made earlier on are as good as lip service since they do not seem to benefit the poor in the real sense.

2.5 STATE PLANNED WATER SERVICES

Up until now, the South Africa water industry, which comprises the Department of Water Affairs and Forestry, Water Boards, Municipalities and Metropolitan Councils and is charged with the responsibility of supplying quality water to all citizens, is facing enormous challenges that are mostly linked to the socio-political past of South Africa as indicated by the officials of the Municipality. The two major challenges are:

- The huge backlog of water services. Estimates shows that about 25% of the country's population are without adequate basic water services.
- Inadequate financial viability of the Water Services Authorities/Local Municipalities caused by inefficiencies and the continued culture of non-payment of services. (Unpublished report of Working for Water program, 2000)

According to the officials of the Tygerberg Municipality, the South African water services' industry operates within three typical service provision settings, which experience enormous discrepancies in terms of levels of services as well as water demand. These settings are as follows: former white towns and cities, former urban black townships and peri-urban and rural areas.

There is no doubt that in South Africa the water services in most of the former white towns and cities is similar to first world standards. This perspective concurs with Bakker & Hemson's (2000) view that white communities continue to 'enjoy the first world' services. This is simply because during the previous regime the water reticulation systems in these areas were adequately maintained with levels of water losses/leakages below 17%. However, at present, the levels of water losses/leakages are quietly increasing due to the fact that the limited equipment that were used to maintain the reticulation system in these areas currently have more points to cover. In these areas the majority of domestic water consumers are individual houses with large gardens and lawns

thus resulting in the average domestic homeowner's water consumption exceeding 35kl/month as compared to other households with little or no garden who use less than 35kl/month.

In the former urban black townships the water services are limited and in most cases the services comprise only a toilet and a tap for each stand. This is due to the fact that in the past water delivery in these areas was not given high priority. Moreover, adequate operation and maintenance of the reticulation system was not carried out and as a result high levels of unaccounted for water are experienced (i.e. water lost in the system). Furthermore, the black townships are known for very low levels of payments, water leaks, poor metering and billing and inefficient water usage which indicates an irresponsibility in terms of conserving water resources.

Focusing on peri-urban and rural areas, it is clear that in the past most of these areas did not have access to water services in that people had to rely on water taken directly from water streams and bore holes. In these areas, the levels of water services supplied to individual consumers vary from one place to another. As a rule, communal standpipes are popular water services in these areas. However, pollution of water sources and limited knowledge of preservation of water resources in peri-urban and rural areas continue to be a salient issue that needs prompt action for health reasons. Regarding the problem of inadequate access to water services, a number of projects have been commissioned to supply this particular service. More importantly, it is currently the national government's objective to supply basic water services to all people of South Africa (Unpublished report of Working for Water Program, 2000).

It is within these sets of scenarios that the South African water industry (i.e. DWAF, Water Boards, Municipalities and Metropolitan councils) is working hard to provide a basic water supply described by DWAF (1994) as well as targeted by the RDP, as 25 liters of potable water per person per day within 200 meters from each dwelling, at 'lifeline' tariffs (this is normally a communal standpipe) because 25% of the country's population are still living without adequate basic water services. In line with this, the

industry is also constitutionally obliged to manage the nation's water resources in the public interest.

From an operational point of view, DWAF acts as the custodian of all water and its new policies place a strong emphasis on equity. All water services providers within the country are required to observe this emphasis in the development of local structures and in the actual setting of tariffs. To date, DWAF is championing the implementation of 'water conservation and demand management' as a new paradigm that requires service providers to become more accountable and responsible to their consumers. In a way, the overall thrust of the water conservation and demand management paradigm is to promote efficient water use by making sure that water losses and waste are minimized and the escalating water demand is contained within the available volume of resources.

2.6 AN OVERVIEW OF WATER POLICY

Like many other policies, the South African water policy has also undergone a period of major transition. In 1998 the country's new water policy placed an emphasis on supplying potable water (i.e. 25 liters per day per person) and managing the water resources for the benefit of all South Africans.

Ever since that time, in policy development circles, certain principles have been earmarked or conceived in one way or another as building blocks of the new policy. In a nutshell these principles are based on equity, efficiency and sustainability. By viewing these principles in a wider perspective the policy's emphasis on equity relates to ensuring that water is shared equally and all levels of society can make use of it. This means that the task of water supply to consumers must comply to one of the following four levels of supply: a standpipe within 200m of the dwelling or a yard tap with limited supply or a yard tap with full supply or full service inside the house. In the current language of water conservation, ensuring equity of access also entails concern for conservation.

In terms of efficiency, the policy requires that all water consumers be more responsible and use water efficiently with little or no wastage at all. Finally, in relation to the principle of sustainability, the policy stresses the need to use water wisely so that future generations can also benefit from water. In addition, this principle entails also environmentally sustainable water use, which is the art of reducing water demands so as to make certain that the hydrological cycle is maintained by meeting environmental water needs. It is within this context that the South African water policy currently affirms the indivisibility of water resources and seeks to protect both surface water and underground water for the benefit of all citizens (DWAF, 1994; DWAF, 1997; Ashton and Braune, 1999).

2.6.1 Communication of water policy to local municipalities

As a matter of principle, here in South Africa, the National Department of Water Affairs and Forestry does not communicate directly with the end users of water. According to the officials of the City of Tygerberg, the national government is inclined to communicate directly to the end users only on those issues that are in one way or another politically based or influenced in the press or pamphlets or through environmental impact assessment reports.

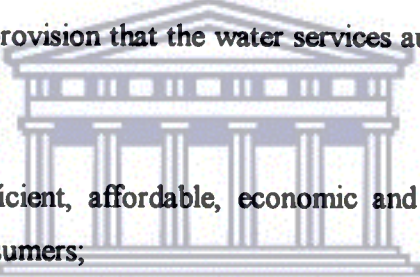
In this respect and in line with the constitution of South Africa, the Water Services Act (No. 108 of 1997) and the National Water Act (No.36 of 1998) governs the exercise of water policy execution in the lower levels of the government structure (i.e. local municipalities). The above-mentioned Acts provides the legal framework within which water supply and water use need to take place.

In practice, the National Water Act (No.36 of 1998) regulates the use of water resources in South Africa. According to DWAF (1999) the main purpose of the Water Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled. It seeks, therefore, to take into account the promotion of efficient and sustainable use of water to the benefit of all its users. This Act also provides

regulations in the use of water through a system of water licensing, water allocation and water use charges.

The Water Services Act (No.108 of 1997) exists to regulate the provision of water services. This Act allows for the Water Services Authorities/Providers to be responsible for the provision of water services to end consumers. Water Service Authorities essentially include local government structures such as District Municipalities or Local Municipalities in urban areas (DWAF, 2001).

From the policy implementation point of view, it is the objective of the two Water Acts to see to it that all of the water service institutions and water management institutions institute necessary measures and regulations to curb the use of water in one way or another. It is in the light of this provision that the water services authority must fulfill the following functions:

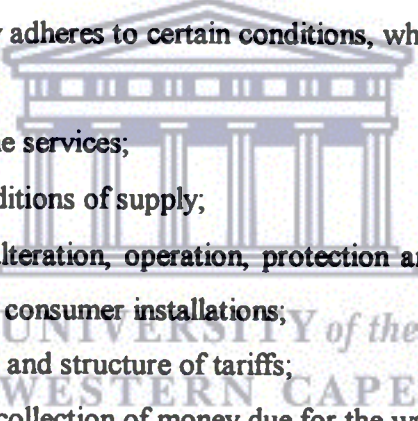
- 
- To ensure access to efficient, affordable, economic and sustainable access to water services for all consumers;
 - To make bylaws;
 - To prepare a water services development plan;
 - To perform the function of a water service provider or to contract a water services provider.

In a much more detailed context (DWAF, 2001), the duty to ensure access to services by the Water Services Authority is subject to:

- The availability of resources;
- The need for an equitable allocation of resources;
- The need to regulate access to water services in an equitable way;
- The duty of consumers to pay reasonable charges;
- The duty to conserve water resources;
- The nature, topography, zoning and situation of the land in question.

While operating in its area of jurisdiction, the above authority has the right to limit or discontinue the provision of water services if there is a failure to comply with reasonable conditions, which are stipulated in advance, for the provision of water services. Furthermore, the authority has the right to also impose reasonable limitations on the use of water services. More importantly, water service authorities are also charged with the responsibility of developing water services policies such as the free basic water policy and other policies that are related to equitable sharing and the channeling of grants (DWAF, 2001). The above-mentioned types of policies must be integrated and consistent with other municipal services policies.

When formulating bylaws, according to DWAF (2001:27), each water services authority is obliged to ensure that the bylaw adheres to certain conditions, which relate to:

- 
- The standard of the services;
 - The technical conditions of supply;
 - The installation, alteration, operation, protection and inspection of water services work and consumer installations;
 - The determination and structure of tariffs;
 - The payment and collection of money due for the water services;
 - The circumstances under which water services may be limited or discontinued;
 - The procedure for discontinuing and limiting the services;
 - The prevention of unlawful connection to water services works;
 - The unlawful or wasteful use of water

Regarding the development of plans, the water services authority is required to prepare a draft water services development plan for its area of jurisdiction. The water services development plan serves as a tool to assist authorities to make informed decisions about water services, and to plan for those communities that do not have access to basic services (DWAF, 2001:28).

Lastly, in connection with the aspect of water services' authority contracting a water services provider, as per Water Services Act, the water services provider in question must adhere to all bylaws set by the water services authority. In addition, the water provider must report to the water services authority on the services provided.

In sum, the water services authority/local municipality is directly responsible to the National Department of Water Affairs and Forestry as far as the task of water provision is concerned at the local level. The reason behind this direct communication is that there is no Provincial water office or Provisional Water Act that could influence the activities of the local municipality. In this case, the local municipality is only obliged to comply with the conditions stipulated by the National Water Act.

In order to facilitate the smooth implementation of the National Water Act, the National Department of Water Affairs and Forestry has established several regional offices in different parts of the country. These regional offices provide a link between local municipalities and the National Department of Water Affairs and Forestry. In practice, the regional offices have the national responsibility of ensuring that the local municipalities enforce the National Water Act appropriately. It is within this framework that last year (2000), on September 19, the regional office had to communicate the water restrictions to the Western Cape local municipalities, following the announcement by the Minister of Water Affairs and Forestry regarding water shortages in the Western Cape.

2.6.2 Local municipalities and the implementation of water conservation and demand management

In an attempt to enforce the water conservation and demand management measures, it was imperative for each municipality of the Cape Metropolitan area (currently known as the Unicity) to propose and implement a new water tariff due to restrictions. In this respect, in November 2000, the Municipality of the City of Tygerberg was forced to put

into practice the following water tariff structure as summarized by the table below due to water shortages.

Table 2.2: Old water tariff and proposed new restrictive water tariff for residential consumers

Old water tariff for residential consumers prior to restrictions		Proposed new restrictive water tariff for residential consumers	
Amount of water in Kl per month	Rand per Kl	Amount of water in Kl per month	Rand per Kl
0-----6	1.085	0 ----- 6	1.14
7 -----30	1.85	7 -----30	1.94
31-----50	2.35	31-----50	2.47
51-----80	3.05	51-----60	3.20
81 +	3.90	61 +	6.30

Source: City of Tygerberg 2000:

Table 2.2 compares the old water tariff structure with the new tariff structure. A comparison of the tariffs per kiloliter clearly indicates that the proposed new water tariff structure shows an increase of five-percent due to restrictions for residential water consumers. The five-percent increase in water tariffs due to restrictions is mainly to ensure sustained income to the municipality to counter reduced sales.

However, what needs to be pointed out here is that in the final analysis the water consumers will have to bear that burden of increased water bills. The increased tariffs will place a heavy burden on certain sectors of society, an issue that could have far reaching implications. It is within this context that this study attempts to investigate people's perceptions and attitudes on the current water restrictions and demand management policy.

2.7 CONCLUDING SUMMARY

Indeed, the increased demand for water by various water user sectors appears to be a permanent phenomenon and if not monitored properly, the demand will increase in the future despite the fact that the water resources are dwindling. By virtue of the fact that the government is the guardian of people's interest, it is essential that the government continue to relentlessly enact and enforce a variety of laws to govern water usage.

Nonetheless, what needs to be discovered at this juncture is the attitude of the people towards water policy. It is therefore crucial to gain a clear understanding of firstly the factors that influences household water demand, and secondly the perception of people with regard to the water restrictions. This information will go a long way in assisting policy makers to make much more informed decisions that can be executed in all levels of the government.

In lieu of the above, the following chapter will provide an outline of the findings of the factors that influence water demand and usage in an urban area in the Western Cape.

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CHAPTER THREE

URBAN WATER DEMAND AND USAGE BY SOCIO-ECONOMIC GROUPING

Rapid urbanisation, droughts, limited storage facilities; unnecessary water losses and leakages are placing increasing pressure on South Africa's limited urban water supply. South Africa's new water policy is committed to conservation programmes, which increase water supply, and the strict management of water demand through the application of appropriate water tariffs, whilst embodying the national values of reconciliation, reconstruction and development (DWAF, 1997).

In an attempt to curb the water scarcity problem, the DWAF has instituted a demand approach, which has been introduced to promote the efficient use of water by focusing on several water use restrictions amongst all categories of domestic water users. However, it is important to determine the socio-economic and political implications of the demand management strategy at the local level on different socio-economic strata of domestic water consumers.

It is against this background that the aim of this chapter is to present and interpret the findings of a survey which was administered to residents in the case study area of the City of Tygerberg. The survey focuses on urban water demand and usage according to three socio-economic groupings with the intention of investigating the factors that tend to influence household water demand and usage.

Questions were posed to residents of the three communities of Durbanville, Belhar and Khayelitsha concerning all domestic activities or water using practices which were likely to influence water demand. The questionnaire of the survey is shown in Appendix 1.

The first section of this chapter will provide the survey results and interpretation. The second section of the chapter will provide a concluding summary, which highlights the main findings of the survey on urban water demand and usage by socio-economic grouping.

3.1 SURVEY RESULTS AND INTERPRETATION

This section deals with the findings of the study in two broad ways: Firstly, a profile of the respondents of the study is presented and the second section provides an analysis of the factors that influence water demand and usage among the three socio-economic groupings.

The survey results are based on the mode as an appropriate measure of central tendency for the data collected in this study (Babbie & Mouton, 1998:423). The mode shows the most typical response i.e. the answer of the majority of respondents to a particular question.

3.1.1 General characteristics of the sample population

Racial composition: With regard to the racial composition of the sample population, the data in Table 3.1 reveals that the respondents of Durbanville were predominantly white (93%), whereas in Belhar mostly were Coloured (97%) and in Khayelitsha all the respondents were Black. Asians only represented 7% in Durbanville and 3% in Belhar.

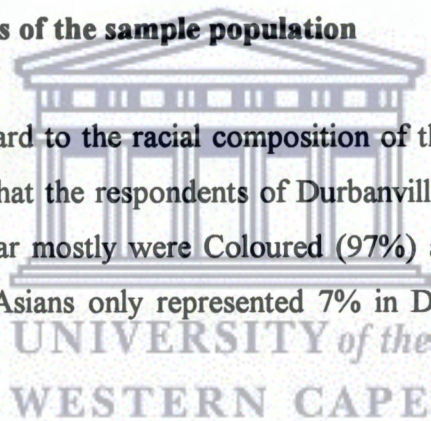


Table 3.1: Racial compositions of the socio- economic groupings (N=90)

Ethnicity	Durbanville	Belhar	Khayelitsha
White	93%	-	-
Coloured	-	97%	-
Black	-	-	100%
Asian	7%	3%	-

Education level: In terms of the levels of educational attainment, it is apparent that the majority of respondents of Durbanville have grade twelve plus a diploma and degree. In the case of Belhar, there are few respondents with less than grade twelve and the rest of the respondents have achieved tertiary qualifications. In Khayelitsha, the educational attainment of the majority of respondents is less than grade twelve.

Table 3.2: Education levels of the socio-economic groupings (N=90)

Education	Durbanville	Belhar	Khayelitsha
< Grade 8	-	-	-
<Grade 12	-	23%	94%
Grade 12 +Diploma	40%	40%	3%
Degree +	60%	37%	3%

Income: With regard to income levels (Table 3.3), the bulk of Durbanville respondents earn more than R10 000 per month, whereas the income of Belhar residents vary between R2001 and R6001 per month. The majority of Khayelitsha respondents earn on average an amount of R1500 per month.

Table 3.3: Monthly income of the socio-economic groupings (N=90)

Income	Durbanville	Belhar	Khayelitsha
R1500	-	-	93%
R 2001-6001	-	93%	7%
R 10000+	100%	7%	-

3.1.2 Water sufficiency testing in the household

In an attempt to establish whether the surveyed households access sufficient water for their family's daily needs, it became clear that all three socio-economic groupings acquire enough water for their family's daily needs.

3.1.3 Categories of domestic water demand and usage

In order to describe the magnitude of domestic water demand and usage in the three communities, the different uses of domestic water were divided into the following three categories:

- *Water for basic needs:* This includes water used for cooking and drinking, washing, bathing and/or showering and the flushing of toilets;
- *Intermediate use of water:* This category includes the filling of water-heaters and geysers, washing vehicles, washing buildings and the washing of paved areas and walk ways;

- *Lavish consumption*: this refers to water usage for the purposes of washing animals, watering of gardens and swimming pools.

Table 3.4: Consumption prevalence among communities

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Water for basic needs	-	-	73	22	24
Intermediate use of water	7	3	10	6	7
Lavish in consumption	93	97	17	62	69
Number of respondents	30	30	30	90	100

In terms of basic needs, the results indicate that the demand and use of water in Durbanville and Belhar areas is by far beyond the demand of water for basic needs only. The water needs and usage of the majority (three-quarters) of respondents from Khayelitsha are only concentrated in water for basic needs.

In sum, in the higher and intermediate status areas of Durbanville and Belhar, almost all consumption is geared towards lavish use, whilst in the lower socio-economic status areas of Khayelitsha largely the opposite was found.

As is expected, these results indicate that there is a strong correlation between socio-economic status and water usage. The more affluent groups make far more use of water for lavish consumption purposes as compared to the poorer residents of Khayelitsha.

3.1.4 Types and usage of household washing equipment in the three socio-economic groupings

This section examines the types and usage of household washing equipment in the three socio-economic groupings.

An investigation of the results presented in Table 3.5 clearly indicates that most Durbanville and Belhar residents own and make use of bath facilities in their households, whereas 60% of the Khayelitsha respondents do not have a bath facility

in their homes. Similarly, in terms of the use of showers, it is also visible from the results that 93% of the respondents of Durbanville and 50% of Belhar have showers in their homes, while 93% of the Khayelitsha respondents do not make use of a shower facility, as they do not possess one.

Table 3.5: Types and uses of household washing equipment

Row % <i>Washing equipment</i>	Durbanville		Total Respondents	Belhar		Total Respondents	Khayelitsha		Total Respondents
	<i>with</i>	<i>without</i>		<i>with</i>	<i>without</i>		<i>with</i>	<i>without</i>	
Bath	97	3	30	93	7	30	40	60	30
Shower	93	7	30	50	50	30	7	93	30
Sink	100	-	30	93	7	30	43	57	30
Hosepipe	-	100	30	-	100	30	-	100	30
Bucket/pail	-	100	30	7	93	30	47	53	30

The usage of sinks in the higher income areas also appears to be very popular compared to Khayelitsha, where only 43% of the respondents use sinks. With regard the use of buckets/pails it is evident that the first two areas virtually do not make use of them, whereas Khayelitsha appears to have 47% of respondents who use buckets/pails for washing. Lastly, the table also illustrates that in both areas there is not one respondent who uses a hosepipe for washing purposes.

3.1.5 Bathing practices of the three socio-economic groupings during summer and winter

The responses of the sample with regard to the average frequency of bathing of the three socio- economic groupings in summer and winter are presented respectively in Table 3.6 and Table 3.7.

Table 3.6: Bathing practices during summer

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
More than once a day	73	73	57	61	68
Once a day	27	27	43	29	32
Once a week	-	-	-	-	-
Longer interval	-	-	-	-	-
Number of respondents	30	30	30	90	100

The results indicate that there is a difference in bathing practices during the summer months in the three socio-economic groupings. According to the distribution of responses, it is evident that bathing practices are similar in the areas of Durbanville and Belhar, where 73% of residents bath more than once a day, whereas Khayelitsha has few respondents (57%) bathing more than once a day in summer.

Table 3.7: Bathing practices during winter

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
More than once a day	57	20	10	26	29
Once a day	43	77	90	63	70
Once a week	-	3	-	1	1
Longer interval	-	-	-	-	-
Number of respondents	30	30	30	90	100

* $p < 0.05$

With regard to bathing habits during winter, it is clear that there is a significant difference in habits within the three locations. Table 3.7 shows a drastic decrease in the number of responses from Belhar and Khayelitsha on the question of whether they bath more than once a day. Moreover, these results show that the majority (i.e. more than 75%) of Belhar and Khayelitsha respondents bath only once a day as compared to their counterpart of Durbanville. This particular case confirms the assumptions that there are significant differences in bathing habits during winter within the three locations.

It can be assumed from these results that the tendency of respondents in all three locations to bath more than once a day in summer is probably associated with the type of weather and the fact that it is not necessary for water users to use some form of energy to heat the water. In this respect, it can be argued that there is some sort of relationship between the bathing practice and levels of income by virtue of the fact that most of the respondents of Durbanville appear to have a higher proportion of respondents who bath more than once a day during summer and winter. Given these facts, it is imperative for local authorities to be aware that the demand and consumption of water in higher income areas is not simply determined by the type of weather. This implies that there is high demand and consumption of water in higher income areas throughout the year.

3.1.6 Car washing practices according to the three socio- economic groupings

The question set under this component was geared at establishing how often the households of the three socio-economic groupings wash their cars at home and at the car wash. The information presented in Table 3.8 indicates the percentage of respondents who own cars and illustrates the frequency with which respondents wash their cars at the car wash whereas Table 3.9 presents the percentage of respondents who own cars and the frequency with which they wash their cars at home.

From the information presented in Table 3.8 it is clear that only residents from Durbanville and Belhar make use of car washing facilities.

Table 3.8: Frequency of washing cars at the car wash in the three socio-economic groupings.

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
More than once a week	3	-	-	1	1
Once a week	10	13	7	9	10
Two- weekly	10	3	-	4	4
Monthly	43	37	-	24	27
Longer interval	20	13	-	10	11
N/P (No car)	13	33	93	42	47
Number of respondents	30	30	30	90	100

In both the above areas, a very small percentage of residents use the car wash on a weekly or fortnightly basis. Both Durbanville residents (43%) and Belhar residents (37%) however tend to use this facility only once a month.

Furthermore, these statistics also indicate that 93% of respondents from Khayelitsha and 33 % from Belhar do not own cars. Surprisingly, the two respondents who own cars in Khayelitsha, which is the lowest income group, wash their cars at the car wash on a weekly basis. This could be ascribed to the fact that the owners use their vehicles for business purposes (i.e. taxi drivers) and can therefore afford to pay for this service.

Table 3.9: Frequency of washing cars at home in the three socio-economic groupings

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
More than once a week	-	-	-	-	-
Once a week	67	57	7	39	43
Two-weekly	3	20	-	8	9
Monthly	3	13	-	6	7
Longer interval	7	-	-	2	2
N/P (No car)	20	10	93	35	39
Number of respondents	30	30	30	90	100

Table 3.9 presents the percentage of respondents who own cars and illustrates how often the respondents of the three locations wash their cars at home. These results depict a different tendency altogether in respect of car washing habits. The overwhelming majority of respondents from Durbanville (67%) and Belhar (57%) wash their cars at home once a week, whereas a much smaller percentage of respondents from Khayelitsha (7%) have the tendency of washing their cars at home once a week as opposed to less frequently.

The frequency of washing cars observed by this study implies that there is still a considerable demand and use of water for car washing in the higher income areas of Durbanville and Belhar compared to Khayelitsha. Thus, it is imperative that local authorities are made aware of the tendency and frequency with which different socio-economic groups demand and use water for car washing in order to achieve desired reductions in water demand.

3.1.7 Clothes washing practices

The question that was raised in this regard aimed at measuring the level of sophistication in washing the family clothes among the three communities. This inquiry is based on the premise that more automated appliances are more wasteful in terms of water use.

Table 3.10: Three socio economic groupings: Mode of washing clothes

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
At home in washing machine	97	100	-	59	66
At home by hand	-	-	100	30	33
Elsewhere (e.g laundry)	3	-	-	1	1
Number of respondents	30	100	100	90	100

The results shown in Table 3.10 indicate that the overwhelming majority of Durbanville (97%) and Belhar (100%) residents wash their clothes at home, making use of a washing machine. One exception was a household in Durbanville who takes the laundry elsewhere (i.e. Laundromat). Conversely, all Khayelitsha households wash their clothes at home by hand.

This result proves the assumption that washing the family clothes by making use of washing machines is associated with the status of the socio-economic groups. The reason for the above trends is probably linked to the great range of socio-economic characteristics of the three locations. Overall, it can be argued that the widespread use of washing machines within a particular living environment is more likely to affect the level of the demand for water in the household. This contention is supported in a study by Stone and Weiss (1995:1) who found that the average top-loading residential washing machines is using about 40% more water than it needs to. By and large, water planners need to be aware that routine use of automatic machines in a particular area increases unnecessary wastage of water.

3.1.8 Gardening practices

In terms of gardening practices, the participants of the study were asked to indicate the type of garden that they own in lieu of establishing the relative demand of water that is required to maintain the garden in question. In terms of the collected data, it is clear that the majority of participants of Durbanville and Belhar cultivate flower gardens. This is an indication that owners of the garden derive a certain satisfaction from admiring the scenic beauty of a garden. Table 3.11 indicates that most of the Durbanville respondents (93%) and Belhar respondents (87%) possess flower

gardens, whereas the majority of Khayelitsha respondents (93%) do not have a garden at all.

Table 3.11: Possession of garden in the three socio-economic groupings

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Flower Garden	93	87	7	56	62
N/A (No garden)	7	13	93	34	38
Number of respondents	30	30	30	90	100

* $p < 0.05$

These differences were tested and proved again to be significant. This suggests that there is a relationship between the possession of a flower garden and the socio-economic status of the grouping. It is therefore logical to assume that the possession of a flower garden is also a factor that can be regarded as necessary and sufficient to signal a higher demand for water in higher income areas, not only at present, but also in the future.

3.1.9 Watering of gardens in the three socio-economic groupings

The analysis carried out in this section was mainly geared at measuring the levels of sophistication in watering the gardens in the three communities. Put differently, the analysis aimed to establish the efficiency of the method of watering in terms of water use. This particular inquiry is considered necessary because the type of equipment that is used to water a garden can have a major influence on the amount of water used. The responses in this regard are presented in Table 3.12.

Statistics indicate that most Durbanville residents use a sprinkler system and hosepipes, whilst those in Belhar use mostly hosepipes. Very few people from Khayelitsha use water for gardening. This can be attributed to the fact that the majority of residents in this area are primarily concerned with basic survival needs and have limited economic power to satisfy even these primary needs. Secondly, the plots on which they live are too small to support gardens.

Table 3.12: Watering gardens in the three socio-economic groupings

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Bucket	-	-	7	2	2
Hosepipe	33	70	10	34	38
Sprinkler system	50	23	-	22	24
Computerised sprinkler system	13	7	-	6	7
N/A	3	-	83	26	29
Number of respondents	30	30	30	90	100

When reflecting on the sample's socio-economic profile and the data presented in Table 3.12, one can conclude that garden watering methods adopted by different households is a function of income. This is indicated by the fact that a good number of respondents living in the highest income area of Durbanville use a sprinkler system in comparison to Belhar respondents who only use hosepipes. In terms of household water demand and consumption, water planners need to be aware that the residential water demand for both Durbanville and Belhar is relatively high as more water is needed for landscape irrigation as compared to the Khayelitsha area where gardening practices are not popular. This line of argument concurs with the work of Renwick, Archibald & Sandra (1998) who maintained that households with larger areas are expected to demand more water, all other factors held constant.

3.1.10 The mode of household water access

In terms of accessing water in the households, an attempt was made to ascertain the households' ease of access to water. The importance of this enquiry is based on the assumption that when water consumers have convenient access to running water; they often use more water than they actually need. Respondents were required to indicate how they accessed water for the household and whether they made use of either communal taps, taps placed inside the home or taps placed outside the home.

Table 3.13: Three socio economic groupings: mode of water access in the household

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Communal street tap only	-	-	-	-	-
Onsite tap(s) outside only	-	-	50	15	17
Onsite tap(s) inside and out	100	100	50	75	83
Number of respondents	30	30	30	90	100

The results in Table 3.13 illustrate that all the surveyed households (100%) of Durbanville and Belhar access their household's water from water taps placed inside the home. With regard to Khayelitsha, only 50% of the surveyed households access water from inside the home and the other 50% of residents access their water from an outside standpipe on site.

It is felt that the ease with which water is accessed in a home is a significant factor, which can influence water demand and usage in the household. Hence, this study assumes that those households with water connections inside the house are more likely to demand and use water more freely compared to households that access water outside the house, from onsite taps. The Population Report (1998) supports this argument noting that a household's convenient access to water is associated with an increase in water use. Furthermore, the Report finds that in the United States of America, where there is easy access to water sources, the average personal use of water is nearly 600 litres per day, compared to about 50 litres per day per person in India.

3.1.11 Attitude towards leakages and water wastage

With regard to the issue of water wastage, Table 3.14 indicates that all three socio-economic groups appear to be aware of the value of water conservation and the water shortage in the Western Cape. Responses relating to leaking taps clearly show that all households take the responsibility of trying to fix leaking pipes. Residents either use their own initiatives to fix the leak or get a plumber to fix the leak. All respondents

indicated that they would not let the tap just run.

Table 3.14: Attitudes towards leaking tap/water wastage

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Repair it yourself: immediately	30	60	60	45	50
Get a plumber to fix: immediately	70	40	40	45	50
Report to water authority: immediately	-	-	-	-	-
Just let it run	-	-	-	-	-
Number of respondents	30	30	30	90	100

The above statistics show that, despite the different economic status of the sample population, all respondents show a positive attitude towards water conservation and make a concerted effort to prevent water wastage. The only difference is the method employed to fix leaking pipes and understandably the residents of the higher income group can afford to get outside assistance for this purpose.

3.2 CONCLUDING SUMMARY

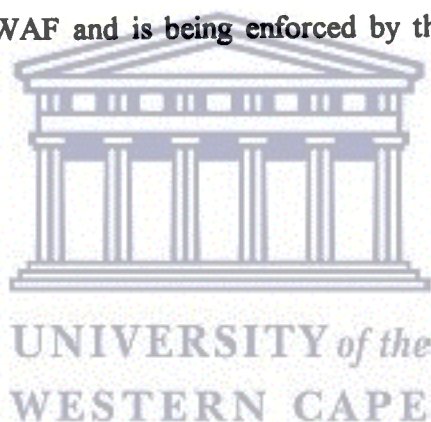
Analysis of the empirical data gathered from residents of the areas of Durbanville, Belhar and Khayelitsha reveal an array of water using tendencies that are likely to continue to place a high demand on water. Moreover, this study highlights the enormous differences in the way that water is used among the three socio-economic groupings.

Overall, the findings of the study prove that the differences that exist in the patterns of water demand and usage are directly associated with the economic status of the grouping. A higher economic status enables the group in question to possess a wider range of water using gadgets and facilities, which at the end of the day intensifies the household usage of water. Moreover, higher economic status enables certain communities to live in areas which are less densely populated with large houses on

big plots, verdant gardens, swimming pools as well as more vehicles per family which in turn places a higher demand on water resources.

It is of great importance that water authorities and planners take note of these general findings in their attempt to conserve water and increase South Africa's urban water supply. The patterns of water demand and usage outlined above should be kept in mind when aspects such as appropriate tariff structures and restrictive usage of water sources are formulated and incorporated into policy. Cognizance of these findings will go a long way in reconciling the needs of the water service providers with the priorities of water consumers.

With this in mind, the next chapter will focus on the opinions and perceptions of the three socio-economic groupings with regard to the water regulations, which has recently been instituted by DWAF and is being enforced by the Municipality of the City of Tygerberg.



CHAPTER FOUR

WATER USE AND WATER REGULATIONS: LOCAL OPINIONS AND PERCEPTIONS

In the past, in South Africa, the dominant minority were privileged with efficient water services and also had access to land and economic power. The new democracy, however, demands that national policy on water use and the water law must not only reflect the values of fairness and equity of South Africa's new Constitution, but must also reflect the limits to the water resources which are available to the nation. It is therefore imperative that the national water policy must underpin the public efforts to manage water resources.

With this in mind, and in broad terms, this chapter seeks to examine public opinion regarding water use and water regulations that are stipulated in the water policy. In order to achieve this aim, the attitudes and perceptions of three socio-economic groupings towards water use and water restrictions will be investigated, analysed and interpreted. A wide range of questions, which address specific issues relating to selected components of the water policy, such as mode of water provision, cost structures and restrictive measures on outdoor water usage, were set (see Appendix 1).

This chapter will therefore firstly provide survey results and interpretation. Thereafter, the chapter will provide a concluding summary, which highlights the main findings of the survey on opinions of water users with regard to water restrictions.

4.1 SURVEY RESULTS AND INTERPRETATION

This section presents and analyses the results of the survey on opinions of the three socio-economic groupings with regard to water usage and water restrictions. An understanding of the opinions of different socio-economic groupings regarding water usage and water restrictions will provide valuable information to relevant authorities in terms of how the water policy affects the consumer.

4.1.1 Water provision

Regarding the cost of water to urban households, respondents in the case study area were asked to indicate whether they felt that the provision of water should be a free service, or whether they felt that it should be supplied at full cost.

Table 4.1 Cost of water provision

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Free of charge	17	47	77	42	47
At full cost	83	53	23	48	53
Number of respondents	30	30	30	90	100

In terms of the cost of water provision, the difference in responses of the three socio-economic groupings was fairly pronounced. Table 4.1 indicates that the majority of Durbanville respondents (83%) are of the opinion that water should be provided at full cost. The responses from Belhar residents are interesting, because almost half (47%) of the respondents specified that they would like water to be provided free of charge, whereas the remaining 53% indicated that water should be provided to households at a full cost. Lastly the results also show that a fairly large number of Khayelitsha respondents (77%) feel that water provision should be free of charge with the remainder signifying that water should be provided at full cost.

In general terms, it appears that there are still a significant number of people who are of the opinion that water should be provided free of charge. In one of his works, Viessman (1990:4) informs us that "too many U.S. citizens still believe that water should be free and that they should be able to use it in any way they see fit". He is adamant that this sort of mindset has played a significant role in encouraging inefficient water use.

4.1.2 Funding for free water

Respondents who indicated that water must be provided to households free of charge were asked to indicate which government structure (i.e. national government,

provincial government, Cape Metropolitan Council and the Metropolitan Local Council) should provide the funding for free water.

Table 4.2: Government structure expected to provide free water

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
National government	17	40	60	34	38
Provincial government	-	7	-	2	2
Cape Metropolitan Council	-	-	13	4	4
Metropolitan Local Council	-	-	3	1	1
Non Applicable	83	53	23	49	55
Number of respondents	30	30	30	90	100

Table 4.2 illustrates that the majority of respondents, who think that water should be provided free of charge, are of the opinion that the national government should provide the funding for free water. In this regard, Durbanville has a relatively low proportion of respondents (17%) who think that national government should be responsible for providing water free of charge. Belhar has 40% of respondents and Khayelitsha 60% of respondents who believe water should be provided free of charge by the national government. Furthermore, the results reveal that very few respondents from Belhar and Khayelitsha have suggested other funding structures, apart from the national government.

Regarding public awareness of water restrictions, the respondents of the study were asked whether they were aware of the water restrictions in the Western Cape. According to the responses, it was clear that all respondents were informed of the ongoing water restrictions. This particular level of respondent awareness can be associated with the status of the centralized network of communication within the country.

4.1.3 Mode of communication of water restrictions

In this regard, the respondents of the study were asked to note the mode of communication that was responsible for the distribution of information relating to water restrictions in their respective areas.

Table 4.3: Mode of communication of the new water regulations

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Told by a friend/ acquaintance	3	3	3	3	3
Notice included in municipal account	30	33	23	26	29
Letter from the municipality	50	50	43	43	48
Read a bulletin of the Municipality of the City of Tygerberg	-	3	20	7	8
Read about it in a newspaper	17	10	10	11	12
Number of Respondents	30	30	30	90	100

The results illustrated in Table 4.3 indicate that the Tygerberg Municipality played a leading role in the dissemination of information to the majority of respondents. Durbanville and Belhar residents had an equal number of respondents (50%) who received letters from the municipality to warn them about the water restrictions. The majority of Khayelitsha respondents (43%) also received letters from the municipality as mode of communication of water restrictions.

Again, in all of the three socio-economic groupings, there are a fair number of respondents who reported receiving a notice about water restrictions via their municipal water account. The results also reveal that very few respondents of the study indicated that friends told them about the restrictions or they read about it in the newspaper. In general, it can be concluded that the sample respondents were adequately informed about the water restrictions. Furthermore, in terms of the efficiency of information transmission, the survey results show that all the

respondents felt that the mode of communication that was used to communicate the water regulations and restrictions was effective.

4.1.4 Payments of water accounts

The question raised under this issue was aimed at measuring the severity of actions that were likely to be taken by the water services provider for non-payment of accounts and how people would feel about these actions.

Table 4.4: Response by socio-economic groupings regarding steps to be taken in case of non payment of accounts

Column %	Durbanville	Belhar	Khayelitsha	Number of Respondents	%
Maintained indefinitely	-	3	-	1	1
Maintained for a limited time to allow payment	43	53	-	28	31
Turned off immediately	7	3	-	3	3
Turned off after warning-within a week	3	-	3	2	2
Turned off after warning-within a month	43	23	27	27	30
Turned off after warning-within a longer time	3	17	70	29	33
Number of respondents	30	30	30	90	100

As illustrated in Table 4.4, a trend is noticed with regard to the majority of Durbanville respondents who indicated that authorities should grant a period of warning after failure to pay water accounts. These respondents are equally in favour of the option in which water services are maintained for a limited time to allow payment (43%) if they fail to pay their water account and also support the option where water services are turned off after a warning within a month (43%).

The majority of Belhar residents (53%) are in favour of the option in which if they fail to pay their water account, then the water service should be maintained for a limited

period of time to allow the payments to be made and also the option in which the water services are turned off after a warning within a month (23%). In Khayelitsha 70% of respondents claimed that the water services should be turned off after warning within a longer period. With regard to the question of whether households have managed to reduce their daily water consumption, the results show clearly that all households in the three locations have managed to reduce their daily consumption.

4.1.5 The rights of individuals to use water for survival

In this section, an attempt was made to establish whether the respondents of the study agree with the statement that water is a basic need required for survival. The results indicated that all respondents from the three socio-economic groupings agree with the statement. There were however differences in agreement to the statement that everybody has the right to use water for survival in the same way as the air we breathe free of charge. The findings are presented in Table 4.5.

Table 4.5: Right to use water for survival

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	30	47	100	69	77
Disagree	70	53	0	21	23
Number of respondents	30	30	30	90	100

The overall results indicate that 70% of Durbanville respondents disagree with the statement that everybody has the right to use water for survival in the same way as the air we breathe free of charge. On the other hand, in Belhar, only 53% of respondents disagree with the statement, whereas all Khayelitsha respondents agree with the statement.

It is therefore clear from the above statistics, that the lower income group, living in Khayelitsha, favours unrestricted access to water, whereas the higher income group favours restricted access to water. In a broad perspective this implies that the lower income group regard water as a basic necessity, which is abundant like air, and can be used freely. On the other hand the higher income group regard water as a basic necessity, which is not abundant like air to be used freely.

4.1.6 Provision of cost free water to lower income households

With regard to the statement that all water should be provided free of charge to households earning less than R1000 per month, it is apparent in the results (Table 4.6) that 73% of Durbanville respondents disagree with the statement. In a similar vein Belhar has a large proportion of its respondents (53%) who disagree. A significant 96% of Khayelitsha respondents agree with the statement.

Table 4.6: Cost free water to households earning less than R 1000 p/m

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	27	47	97	51	57
Disagree	73	53	3	39	43
Number of respondents	30	30	30	90	100

These results demonstrate that there is a strong correlation between the desires to have access to free water with the socio economic status of the location of the respondents. Overall, it can be argued that higher income groups feel that the lower income groups should at least pay something, even if it is very little, towards the provision of a water service.

4.1.7 Provision of water for basic needs free of charge to lower income households

The intention of this section was to establish whether the respondents of the study accept that water for basic needs should be provided free of charge to households earning less than R1000 per month.

Table 4.7: Water for basic needs free of charge to household earning less than R 1000 p/m

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	93	71	97	87	97
Disagree	7	-	3	3	3
Number of respondents	30	30	30	90	100

Virtually all the respondents of the survey (Table 4.7) agree that water for basic needs (i.e. 25 litres per person per day) should be provided free of charge to households earning less than R1000 per month. These responses indicate that all categories and strata of water users find it acceptable for lower income earners to be provided with water for basic needs at no cost.

4.1.8 Flat rate water tariff *vis a vis* progressive water tariff

The results in Table 4.8 pertaining to the statement that every one should pay the same amount for water used, irrespective of amount consumed, indicates that almost all the respondents of the three locations disagree with the statement.

Table 4.8: Flat rate tariff to all water consumers

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	17	-	-	5	6
Disagree	83	100	100	85	94
Number of respondents	30	30	30	90	100

These responses are probably associated with the fact that water consumers find it more logical to pay for the water that they have actually consumed. In addition, consumers probably feel it is unjust that people who waste water pay the same amount of money as people who carefully try to conserve water and stick to the specified restrictions or regulations.

Table 4.9: Payment of the same tariff per unit used

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	87	100	100	86	96
Disagree	13	-	-	4	4
Number of respondents	30	30	30	90	100

In terms of the progressive water tariff, all respondents of the three locations (Table 4.9) agree with the statement that everyone should pay the same tariff per unit used. (i.e. if you use more then you pay more)

4.1.9 Higher water tariffs for greater volumes of water consumption

The aim of this section was to establish whether the respondents of the study agree or disagree with the statement that households earning more than R 10 000 per month should pay an incremental tariff on water use in excess of the basic need amount, in order to subsidize water provision to households earning less than R1000 per month. The results presented in Table 4.10 indicates that the majority of Durbanville respondents (77%) disagree, whilst the bulk of respondents from Belhar (87%) and Khayelitsha (94%) tend to agree with the above statement.

Table 4.10: Charging of higher prices to households earning more than R 10000 (p/m) for greater volumes of water consumption

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	23	87	94	61	68
Disagree	77	13	7	29	32
Number of respondents	30	30	30	90	100

Generally, these results indicate that higher income water users are not willing to pay an incremental tariff in order to cross-subsidize lower income water users. In line with the tariff principles, which require fairness in the tariff structure (DWAF; 1997), one can argue that this would be unfair to customers in the higher income group, who have been dutifully paying the water bills to continue to pay higher prices, when lower income water users historically tend to avoid payment of accounts.

4.1.10 Necessity of water restrictions in urban households

This section aimed at discovering whether the respondents of the study recognize the necessity of regulating the amount of water used by urban household in the Western Cape.

Table 4.11: Responses by socio-economic groupings regarding water restrictions

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	97	100	93	87	97
Disagree	3	-	7	3	3
Number of respondents	30	30	30	90	100

The results presented in Table 4.11 illustrate that the majority of respondents of the study agree with the statement that it is necessary to regulate the amount of water used by urban households in the Western Cape. A possible explanation could be due to the current wide publicity on water shortages in the region from a number of quarters and increased awareness of the need to conserve a valuable dwindling resource.

4.1.11 Seasonal pricing of water

The intention of this section was to ascertain whether households in the sample were in favour of seasonal pricing of water. Whipple (1994:61) describes the seasonal pricing of water as the practice of setting the price of water higher during periods of seasonal high use (summer) as opposed to lower winter rates. In essence, this particular option of water conservation is geared at discouraging consumers of water from using more water during summer. From the statistics shown in Table 4.12, it is evident that very few respondents from the three locations agree that higher water tariffs per unit during summer and lower tariffs per unit during winter is an acceptable saving measure.

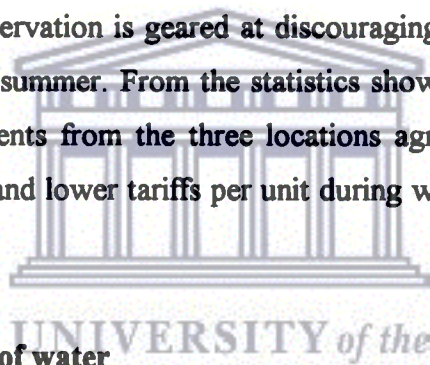


Table 4.12: Seasonal pricing of water

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	30	13	3	14	15
Disagree	70	87	97	76	84
Number of respondents	30	30	30	90	100

The results in Table 4.12 show that in Durbanville only 30% of the respondents agree with the option of saving water by means of the seasonal pricing of water. In the case of Belhar only 13% of the respondents agree and in Khayelitsha only 3% of the respondents agree.

Clearly, the majority of respondents in the sample appear to disagree with the option of the seasonal pricing of water. It is interesting that the percentage of respondents who tend to agree, appears to decrease significantly in line with the socio-economic status of the grouping.

What is very clear, however, from the above statistics, is that the respondents of the study are not prepared to pay more for the consumption of water during summer. These findings are in line with those of Gradilone (in Whipple 1994:59-60), who found that increased summer water rates always cause a storm of protest in the community. According to him, water consumers do not like increased seasonal water rates. Consumers have indicated that water rates are always raised annually and an additional increase in rates during summer will ultimately mean paying more and place additional financial stress on the consumer.

The research findings of this study conform to Gradilone's findings in the United States. Respondents from all three socio-economic groupings in the case study area offered similar reasons as those provided above, for their disagreement in terms of increased tariffs during summer months.

4.1.12 Days and hours for watering the lawns and gardens

This section aimed to find out whether the respondents of the study consider the enforcement of watering the gardens on alternate days and during certain hours in order to reduce external water consumption, as a feasible water saving measure. The findings of this section are presented in Table 4.13 and Table 4.14.

Table 4.13: Watering of lawns and gardens on alternate days only

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	97	90	83	81	90
Disagree	3	10	17	9	10
Number of respondents	30	30	30	90	100

Table 4.13 shows the percentage of respondents who agree or disagree with the stipulation that allowing the watering of lawns and gardens on alternate days only (i.e. either odd or even days only) is an acceptable saving measure. The majority of Durbanville respondents (97%) agree with the statement. Likewise, Belhar (90%) and Khayelitsha (84%) have a large proportion of respondents who are of the same opinion and support this regulation. Furthermore, this result illustrates that there is

attenuation in agreement with the decrease in socio-economic status of the three groupings.

Due to the fact that the three socio-economic groupings differ in terms of level of education, it is plausible to assume that the slight decrease in agreement is associated with the decrease in the level of education of the socio-economic grouping. In addition, the decrease in agreement can also be associated with the fact that this particular measure (watering on alternate days only) appears to directly interfere with the consumers daily routine of watering the garden, therefore leading to inconvenience.

Table 4.14: Watering of lawns and gardens during designated hours of the day only

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	90	83	77	75	83
Disagree	10	17	23	15	17
Number of respondents	30	30	30	90	100

The responses of the sample in terms of whether the watering of lawns and gardens during designated hours of the day only (i.e. at night to lower evaporation rates) is an acceptable savings measure, are presented in Table 4.14.

The results show that in Durbanville there is 90% agreement, in Belhar 84% and in Khayelitsha 77% of residents are in agreement. Again, in interpreting these findings, while reflecting on the percentages of agreement, one can easily conclude that there is a strong association between agreement and the socio-economic status of the grouping. By and large, it is possible to assume that the high agreement on the side of the higher income group is firstly associated with their level of education. Secondly, one can also argue that the higher income group agree because their ample time is not greatly being inconvenienced by this measure as they are able to water their gardens at night hours by the use of sophisticated watering equipment which are operated from inside the house without necessarily going out of their houses at night to water the gardens.

4.1.13 Ban on the use of a hosepipe to wash vehicles

This section attempts to determine whether respondents of the study agree that the restriction of using hosepipes to wash vehicles is a saving measure in terms of reducing external water consumption of the household.

Table 4.15: Law against the use of a hosepipe to wash vehicles

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	97	87	97	84	93
Disagree	3	13	3	6	7
Number of respondents	30	30	30	90	100

As the results in Table 4.15 indicate, nearly all respondents (i.e. more than 90%) of the three locations agree that prohibiting the washing of vehicles by hosepipe is an acceptable saving measure. Except for Belhar respondents, where 87% were in agreement, almost all Durbanville and Khayelitsha residents were in favour of the measure. These findings, supporting the ban, are probably linked to the well coordinated media coverage and general publicity relating to water saving measures and the generally accepted fact that using hosepipes can lead to considerable wastage.

Conversely, the lower acceptance of this measure by Belhar residents could point to the fact that some cannot afford to make use of a car wash and will have to spend much more time on cleaning their vehicles by bucket. In addition, the decrease in agreement can also be associated with the fact that this particular measure could also directly interfere with their usual routine practice of washing their cars with hosepipes, therefore leading to inconvenience.

4.1.14 Penalties for transgressing water restrictions

This section discusses the reaction of the respondents to the penalty clause, which accompanies the water restrictions. The results in Table 4.16 reveal that 70% of the respondents of Durbanville agree that punishment of fines up to R1000 or imprisonment, or both, for transgression of water restrictions is an acceptable measure.

Table 4.16: Penalty for transgression of water restrictions

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	70	33	7	29	32
Disagree	30	67	93	61	68
Number of respondents	30	30	30	90	100

In Belhar only 33% of the respondents agree with these penalties, while Khayelitsha has only 7% of respondents who agree. By looking at the line of disagreement, one may conclude from the results that the majority of respondents do not want to be subjected to such harsh legal punishment.

A closer examination of these results seem to indicate an association between support in terms of penalties and the socio economic status of the respondent. It is in this respect that one may assume that the respondents in the higher income group are probably not too concerned about penalties for the transgression of water restrictions for two reasons. Firstly, many individuals in this higher income group can immediately afford to pay a fine of R1000 in the case of being caught contravening the law. Secondly, this group can probably afford to hire a good legal representative who would defend them in a court of law for transgressing the water restrictions, if required.

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4.1.15 Use of indigenous species in gardens to save water

The objective of this section was to find out whether the respondents of the study agree that the use of drought tolerant or native vegetation for lawns and garden plants are an effective water conservation practices.

Table 4.17: Opinions of the three socio-economic groupings regarding plantation of indigenous species in garden

Column %	Durbanville	Belhar	Khayelitsha	Number of respondents	%
Agree	90	97	93	84	93
Disagree	10	3	7	5	6
Number of respondents	30	30	30	90	90

In general, the majority of respondents of the three socio-economic groupings have agreed with the statement that planting of indigenous species (plants that do not require much water) should be encouraged as a saving measure. A possible reason for their consensus could be associated with the fact that the majority of respondents of the study are aware of the water shortages being experienced in the Western Cape province and are aware that most indigenous plants can generally survive with very little water. Secondly, it appears that this particular option does not directly inconvenience the water users nor interferes with their standard of life, but rather conveniences them, as they will need to spend less time watering their plants.

4.2 CONCLUDING SUMMARY

The premise on which this chapter is based is that water consumers are apt to adhere to a very large extent to water regulations and policy provisions that do not interfere with their preferences, lifestyle or standard of living.

The major findings of the research suggest that there is a strong relationship between agreement in terms of policy measures or provisions and the socio-economic status of the grouping. What has emerged from this study is that factors such as level of education, financial status and customs/lifestyle play a very significant role in terms of the responses to many of the above variables relating to water policy.

In terms of education levels, the research results suggest that the more educated the grouping, the higher the level of understanding and agreement with policy options or alternatives that are geared towards water conservation. Conversely, the less educated the grouping is, the greater the trend towards disagreement. This is possibly due to their lack of understanding of the long-term implications of policy measures and need for conservation.

With regard to financial status it is clear that respondents of the affluent grouping do not find it difficult to pay for water services and there is generally consensus among this grouping in terms of acceptance of water regulations.

While the lower income group tend to disagree with some of the policy regulations, this also sometimes appears among the affluent groupings. Such disagreement can be explained as a clash between the policy priorities or maybe consumer preferences. This is also associated with the customs, practices and lifestyles of the different groupings. This means that there is a higher level of disagreement in responses in cases where the regulations cause inconvenience to the consumer and interferes with their preferences, general routine habits and standard of living.

The final chapter will focus on the major findings highlighted in chapter 3 and 4 with the view to providing policy implications and recommendations.



CHAPTER FIVE

SUMMATION, EVALUATION AND RECOMMENDATIONS

An important aspect of this study was to determine policy implications for water conservation and demand management at the local level. It is from this vantage point that efforts have been directed throughout the study towards finding out whether the implementation of the strategy for water conservation and demand management, which in essence entails water restrictions, has the full support of the community.

Moreover, an important facet of this research was to ascertain whether an understanding of the different views of the community on issues of water restrictions could enrich our understanding of water restrictions and the dynamics that are involved in the implementation of water restrictions in terms of different socio-economic groups.

In this final chapter, the research results of the study will be summarized, policy implications will be discussed and an evaluation of the study will be presented. Finally recommendations for future research will be offered.

5.1 SUMMARY OF FINDINGS

From the results of the survey, it is clear that the usage and demand for domestic water in the households of the three socio-economical groups is a function of accessibility to water, the level of income, living environment as well as water usage practices. Overall, the aspect of accessibility to water appears to play a significant role in most of the households' water demand and usage practices, but it should, however, be pointed out that the demand for water in the households of the three socio-economic groupings is further derived from the household's daily domestic activities such as cooking, washing, watering of lawns/gardens and washing of vehicles. All these household activities require the use of water. In general terms, it appears therefore that the socio-economic and cultural conditions of the target groups play a critical role in influencing the patterns of household water demand and usage.

Furthermore, the findings of the study suggest that the water consumers' perspective on the question of water tariffs appears to be mainly influenced by the level of income of each group. Economic status therefore plays a significant role in terms of water tariffs. The majority of respondents from the lower income group and some from the middle income group feel that the higher income group should subsidize water for the lower income groups by paying more for water. On the other hand, the higher income group do not want to find themselves in the position of being compelled or obligated to pay more for water in the form of incremental water tariffs in order to benefit the lower income group.

5.2 POLICY IMPLICATIONS

This refers to the impact of the existing water restriction policy in the Western Cape on different socio-economic groupings, in terms of *existing* household water demand and usage, as well as the *opinions* on water usage and water regulations. The overall goal of this section of the study is to provide useful insights, which can assist the policy makers in designing a policy that encourages conservation of water, whilst promoting and sustaining a higher standard of living.

5.2.1 Policy implications on households' water demand and usage

This section discusses the policy implications of the findings relating to households' water demands and usage in the three income groups in the City of Tygerberg, in the Western Cape. In essence, this section will focus on the policy implications in terms of the following dimensions of household water demand and usage: water for basic needs, indoors water usage, outdoor water usage and water leakages.

5.2.1.1 Water for basic needs

The findings of the study suggest that all three-income groups access enough water for their family's daily needs. This is probably associated with the fact that all households targeted by this study access water from onsite taps (inside/outside), which is supplied continuously. On the whole, this implies that despite water restrictions, all households access sufficient water for basic needs. In this respect,

policymakers should not be concerned with meeting the demands of water for basic needs among the three socio-economic groupings.

5.2.1.2 Indoor water usage

The focus under this aspect relates to the types and usage of household washing equipment and the mode of washing clothes in the three socio-economic groupings. With regard to type and usage of household washing equipment, the results of the study indicate that the higher income areas possess far more water consuming amenities (e.g. sink, bath) as compared to the lower income areas.

With regard to the mode of washing clothes, the findings of the study also reveal different levels of sophistication that prevail in washing the family's clothes among the three income groups. The lower income group wash their clothes at home by hand, whereas middle and high-income groups use a washing machine at home to do their laundry. Generally speaking, these results indicate that the widespread possession of water using facilities naturally predispose most of the higher income households to use more water so as to maintain a certain standard of living. The implications of these findings to policy makers is that there is a need of prescribing feasible and clear directives, which can assist the higher income groups to limit their higher consumption of water, without necessarily forcing them to compromise their standard of living.

5.2.1.3 Outdoor water usage

In terms of this dimension, the results of the study show that the demand and use of water for gardening and swimming pools (particularly in the higher income areas) is much higher than the demand and use of water for washing animals, building's walls and windows. This implies that more water is potentially wasted in watering gardens and filling swimming pools. This finding indicates that it is important for policy makers to design a policy that encourages water conservation, while at the same time promotes and sustains a higher standard of living.

With regard to washing vehicles, the results of the study indicate that middle and higher income groups not only wash their cars at home, but also make use of carwash facilities. This result indicates that the practice of washing vehicles sometimes shifts the consumption of water elsewhere, which implies that the amount of water used will not be reflected at the domain of that particular group. In this case, the policy makers need to be aware of this practice and start to consider the possibilities of regulating the frequency of washing the cars at home and at car wash facilities.

5.2.1.4 Attitude towards water leakages

With regard to the aspect of water leakages, the findings reveal that all respondents of the study immediately repair water leakages within their homes. By and large, this implies that there is less wastage of water through leakages in the homesteads. Secondly, this also implies less cost for the local authority, as there is no need for the deployment of technical personnel in terms of repairing leakages. The key policy implications of these results to the local authority is that the local authority need not be too concerned about the wastage of water in this manner, because people are concerned about leakages and tend to fix the leakages as quickly as possible.

5.2.2 Policy implications of opinions regarding water usage and water restrictions

This section of the study intends to describe and present the policy makers with the opinions and preferences that participants of the study hold with regard to water usage and water restrictions.

5.2.2.1 Awareness of water restrictions

The results of the study make it clear that there is a certain level of awareness among the households with regard to water restrictions. Astonishing, though, is that the demand for domestic water in most of the households appears to be insufficiently sensitive to water restrictions due to the ongoing tendency of using a wide variety of water-using gadgets, as well as the unabated continuation of out-door water use (i.e. watering of gardens and lawns by hosepipe, washing cars, swimming pools etc.).

The key implication of this finding is that, although the public's awareness level is satisfactory, policy makers should assist in translating this awareness to concrete effort to conserve water. Furthermore, policy makers must be concerned about the ongoing tendency to make use of a wide variety of water using gadgets in certain areas.

5.2.2.2 Water payment versus economic status

The higher income responses to increased water tariffs are rather disappointing. Clearly, the higher income group does not feel that they have any responsibility of shouldering the cost of water provision by means of paying an incremental water tariff. However, what is encouraging is the fact that the majority of respondents of the higher income group agree that water should be provided to households at a full cost.

From the study, it is also evident that a very large proportion of respondents from the lower income group and almost half the respondents from the middle-income group do not recognize the economic value of water. This could imply that since these respondents are more financially constrained, the cost of water is not considered as a major priority. Put differently, one can say the cost of water is not constantly in the mind of the poor people. As a consequence, some of these respondents feel that water services should be maintained indefinitely even if they do not pay their accounts and others feel that water should be provided free of charge. The major implications of these findings to policymakers is that they need to be concerned about the value that the general public attach to the resource and make a concerted effort to increase their awareness, as this will impact on the public's acceptance of the conservation measure.

5.2.2.3 Penalties for transgression of water restrictions

As anticipated, major criticisms were levelled at the penalties attached to the water restrictions. The majority of the respondents do not agree with the fact that such harsh penalties should be attached to transgressions of water restrictions. The picture that quickly emerges from the analysis of the responses is that the public is aware of the

legal consequences of transgressing the water restrictions, although they disagree with the penalties to a large extent.

Policy makers should take note of the fact that a significant number of respondents from the middle and low-income groupings are seriously critical of the penalties attached to the transgression of water restrictions. To a large extent their criticism is understandable if one considers that some of the respondents do not recognise the importance of water conservation and therefore do not see the need for such high penalties. For this reason, policy makers should revisit their approach to this issue, by for instance coupling explanations with penalty measure. In this way the water consumers will also be educated about the importance of water conservation.

5.2.2.4 Restrictions on outdoor water usage

With regard to this dimension, the findings show that the line of agreement to the instituted outdoor water usage directives from the local municipality decreases with the decrease in the socio-economic status of the grouping. In terms of policy implications, this means that the policy makers should be concerned about the disagreement of certain respondents and should investigate possible ways of enhancing the awareness that the proposed directives constitute a saving measure as far as water usage for outdoor activities is concerned.

5.3 EVALUATION OF THE STUDY

Numerous studies (Petts, 1988; Michael, 1990; Oudshoorn, 1997; McIvor, 2000) have noted the importance of community involvement in the management of water resources and this issue is of crucial importance for policy makers. In lieu of the general findings of this study and suggested policy implications in terms of household water usage and opinions regarding water restrictions, one can assume that communities have the potential to play an important role in assisting with the management of their water resources. This should not be ignored at times of policy formulation.

On the whole it seems reasonable to assume that the results of this study will help policy makers consider the potential of the people in terms of the following aspects: self initiative, wisdom, accountability, capacity to assume responsibility as well as their support in terms of commitment to conservation measures. All these aspects serve as important ingredients in the overall exercise of setting the policy and policy acceptance. Moreover, this work contributes positively to our understanding of the extent to which the place of residence and socio-economic and cultural conditions of the target groups exert an influence on the patterns of household water demand and usage.

In this part of the study, the author is also inclined to highlight the strengths and limitations of this study. In terms of strengths, and in view of the fact that this survey was conducted in three areas (i.e. Durbanville, Belhar, Khayelitsha) of the City of Tygerberg, there is a possibility that the findings obtained from these three income groups are probably representative of the three-income groups in the Western Cape.

In terms of limitations and weaknesses, this study was ambitious in terms of what it attempted to cover. This means that certain issues were not dealt with in great depth, and in addition, there were also issues that were not explored directly for example the extent to which the size of the household affect the water usage. An important aspect not fully explored was the respondents' reasons for some of their answers provided in the questionnaire. The reason for this limitation is that in many instances the respondents of the study were not ready to provide in-depth reasons for the answers they provided.

5.4 RECOMMENDATIONS

The recommendations of this study are divided into two sections. The first section addresses the practical measures that can be adopted by local authorities and national government to solve the problem of water scarcity. The second section makes an attempt to provide new avenues for future research.

5.4.1 Local Government measures

Local level: The Municipality of the City of Tygerberg should consider the possibilities of managing water at the lowest appropriate level using demand based approaches and should be based on a participatory approach involving consumers, planners and policy makers at all levels. Hence non-water restriction policies such as low-flow equipment, awareness campaigns (sustained campaigns) and education programs should be considered. Furthermore, the local authority needs to have some sense of the general characteristics of households in their service area to enable them to determine a feasible set of policy instruments.

In order to build confidence in other service payers, the local authority should strive to make sure that the law that governs payments of water services is enforced appropriately and that no group of people can avoid paying for service without justifiable reasons.

National level: This level of government should consider the establishment of a subsidy program for low-flow facilities and water saving household appliances. Additionally, the adoption of new technology may prove useful to complement severe water shortages and price policies. Concurrent to this, simple by-laws should be enhanced and enforced appropriately by the municipalities to ensure that all new constructions are installed with low-flush toilets.

In summation, all the relevant authorities should consider the possibilities of involving and engaging the stakeholders and members of the community in the entire exercise of setting up water policies and regulating water use. Lastly, the municipalities need to be more proactive in promoting and funding water conservation and recycling schemes, which may have greater impact on saving water.

5.4.2 Education programs

At the local level, municipal efforts to conserve water should be geared towards educating people to be judicious about water usage at all times and not only during periods of water shortages. In this respect, efforts should be directed at educating people on the socio-economic value of water.

Together with current local authority efforts to educate the public, National Government should also start looking at means to increase the general public's awareness of the importance of this non-renewable resource through aggressive media advertising. Such efforts could include water conservation advertisements in the printed and electronic media, as well as intensification of publications and distribution of advertisements that contain detailed instructions of how one can save water or conserve water in the household.

5.4.3 Avenues for future research

In terms of future research efforts, the following avenues can provide a useful point of departure:

- There is a need to carry out a study, which investigates the extent to which an increase in water price can be an effective tool in reducing water demand and consumption in the household.
- In a similar vein, there is also a need to conduct a study to examine the effects of using the price policy as a primary demand management instrument in a particular locale. This research should be geared at finding out who bears the conservation burden among different socio-economic groupings.

5.5 CONCLUSION

In conclusion, the results of this study provide a starting point for further understanding of the dynamics and determinants of domestic water use in urban households. The findings suggest that an understanding of the extent to which the socio-economic and cultural conditions of the three groupings exert influence on the household water demand and usage, can help the policy makers to set an appropriate policy which is capable of meeting the needs of the people. The findings indicate that there are several issues from both the households' water demand and usage patterns as well as from the opinions of the people regarding water restrictions that have not yet been absorbed into the mainstream of policy concerns. It is on these grounds that this work suggests a number of interventions for addressing water scarcity and water management within the urban households, and a strong emphasis on community involvement in policy making.



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PERSONAL INTERVIEW

Mr. Anic Smit-Chief Technician: Water Services, Municipality of the City of Tygerberg.

Mr. John Roberts - Catchment Manager (Breeder Water Management area), Department of Water Affairs and Forestry- Western Cape Regional office.

Mr. Ahmed Khan- Partnerships Coordinator, Working for Water program- Cape Town.

APPENDIX 1



UNIVERSITY OF THE WESTERN CAPE
UNIVERSITEIT VAN WES-KAAPLAND

WATER CONSERVATION AND DEMAND IN TYGERBERG

This is a questionnaire on water conservation and water demand management. Your answers will aid the understanding of problems experienced since the introduction of new water regulations in 2000 and guide its further refinement. Your information will be treated in strict confidence and no individual will be identified. Please complete all questions as completely, accurately and truthfully as possible.

Please note: This questionnaire must be filled in by the head of the household only.

Number

1: THE RESPONDENT

1.1 Age (years)

1.2 Marital Status Married Single

1.3 Gender Female Male

1.4 Population group Asian Black Colored White

1.5 What is your occupation? (Please specify) _____

1.6 What is your highest educational qualification?

< Grade 5 Grade 5 Grade 8 Grade 12 12+ Diploma Degree +

1.7 How much is the monthly income of your whole household together?

< R1000
R 1000----- 2000
R 2001-----4000
R 4001----- 6000
R 6001----- 10000
R 10001---- 20000
R 20001+

1.8 For how long have you been living in this house?

Less than 1 year	1 year to 5 years	6 years to 10 years	More than 10 years.
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1.9 How many people in each of the following age groups live in your house?

5 years and younger 6 years to-18years Older than 18

2 WATER DEMAND AND USAGE IN THIS HOUSEHOLD

2.1 Does the amount of water your household gets every day fulfill the family's needs?

Yes No

2.2 For which of the following purposes does your household use water?

<input type="checkbox"/> Cooking /drinking	<input type="checkbox"/> Washing animals	<input type="checkbox"/>
<input type="checkbox"/> Washing clothes	<input type="checkbox"/> Watering gardens	<input type="checkbox"/>
<input type="checkbox"/> Washing dishes	<input type="checkbox"/> Washing vehicles?	<input type="checkbox"/>
<input type="checkbox"/> Bathing /showering	<input type="checkbox"/> Washing buildings windows, walls	<input type="checkbox"/>
<input type="checkbox"/> Flushing toilet	<input type="checkbox"/> Washing paved areas/walk ways	<input type="checkbox"/>
<input type="checkbox"/> Fill the water- heater/geyser	<input type="checkbox"/> Swimming pool	<input type="checkbox"/>
<input type="checkbox"/> Other uses (please specify)		

2.3 What type of washing equipment do you use in your house?

<input type="checkbox"/> Bath	<input type="checkbox"/> Hosepipe	<input type="checkbox"/>
<input type="checkbox"/> Shower	<input type="checkbox"/> Bucket/pail	<input type="checkbox"/>
<input type="checkbox"/> Sink	<input type="checkbox"/> Others (Please specify)	

2.4 How often do your family members bath (on average):

IN SUMMER		IN WINTER?
More than once a day	<input type="checkbox"/>	More than once a day
Once a day	<input type="checkbox"/>	Once a day
Once a week	<input type="checkbox"/>	Once a week
Longer interval	<input type="checkbox"/>	Longer interval

2.5 How often is your vehicle(s) washed?

AT THE CARWASH		AT HOME
More than once a week	<input type="checkbox"/>	More than once a week
Once a week	<input type="checkbox"/>	Once a week
Two-weekly	<input type="checkbox"/>	Two-weekly
Monthly	<input type="checkbox"/>	Monthly
Longer interval	<input type="checkbox"/>	Longer interval

2.6 Where is the family's clothing washed?

At home in a washing machine	<input type="checkbox"/>
At home by hand	<input type="checkbox"/>
Elsewhere (E.g. laundry)	<input type="checkbox"/>

2.7 What type of garden do you have?

No garden Flower garden Vegetable garden Other (e.g. hothouse)

2.8 What do you use to water your garden?

Bucket Installed sprinkler system
 A hosepipe Installed computerized sprinkler system

2.9 How do you access water for this household?

Communal street tap only On site tap(s) outside only On site tap(s) inside and out

2.10 In case of a leaking tap in your household what do you do?

Report to water authority: Immediately	<input type="checkbox"/>	After 1 week	<input type="checkbox"/>	After 2 weeks	<input type="checkbox"/>	Longer	<input type="checkbox"/>
Get a plumber to fix it : Immediately	<input type="checkbox"/>	After 1 week	<input type="checkbox"/>	After 2 weeks	<input type="checkbox"/>	Longer	<input type="checkbox"/>
Repair it yourself : Immediately	<input type="checkbox"/>	After 1 week	<input type="checkbox"/>	After 2 weeks	<input type="checkbox"/>	Longer	<input type="checkbox"/>
Just let it run	<input type="checkbox"/>						

3: OPINIONS REGARDING WATER USAGE AND WATER REGULATIONS

3.1 Water should be provided to every household: free of charge at full cost

3.2 If water is to be provided without charge, which of the following structures should provide the funding?

National government	<input type="checkbox"/>
Provincial government	<input type="checkbox"/>
Cape Metropolitan Council	<input type="checkbox"/>
Metropolitan Local Council	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

3.3 Are you aware of the water restrictions that are currently enforced (by the city of Tygerberg)?

Yes No

3.4 By which means were you informed about these new regulations?

Told by a friend/acquaintance

Notice included in my municipal account

Letter from the Municipality

Read a bulletin on the Municipality of the City of Tygerberg

Read about it in a newspaper

Other (please specify) _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

3.5 The above means of communication was effective

Yes No

3.6 If 'no', how could communication have been improved? (Please specify)

3.7 If people do not pay their water accounts, should the water supply be:

Maintained indefinitely

Turned off immediately

Turned off after warning, within a month

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Maintained for a limited period to allow payment

Turned off after warning - within a week

Turned off after warning, within a longer time

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

3.8 Have you managed to reduce your household's daily water consumption since the inception of water restriction in November 1 2000?

Yes No

3.9 If 'no' please specify why you did not manage to reduce the household's consumption:

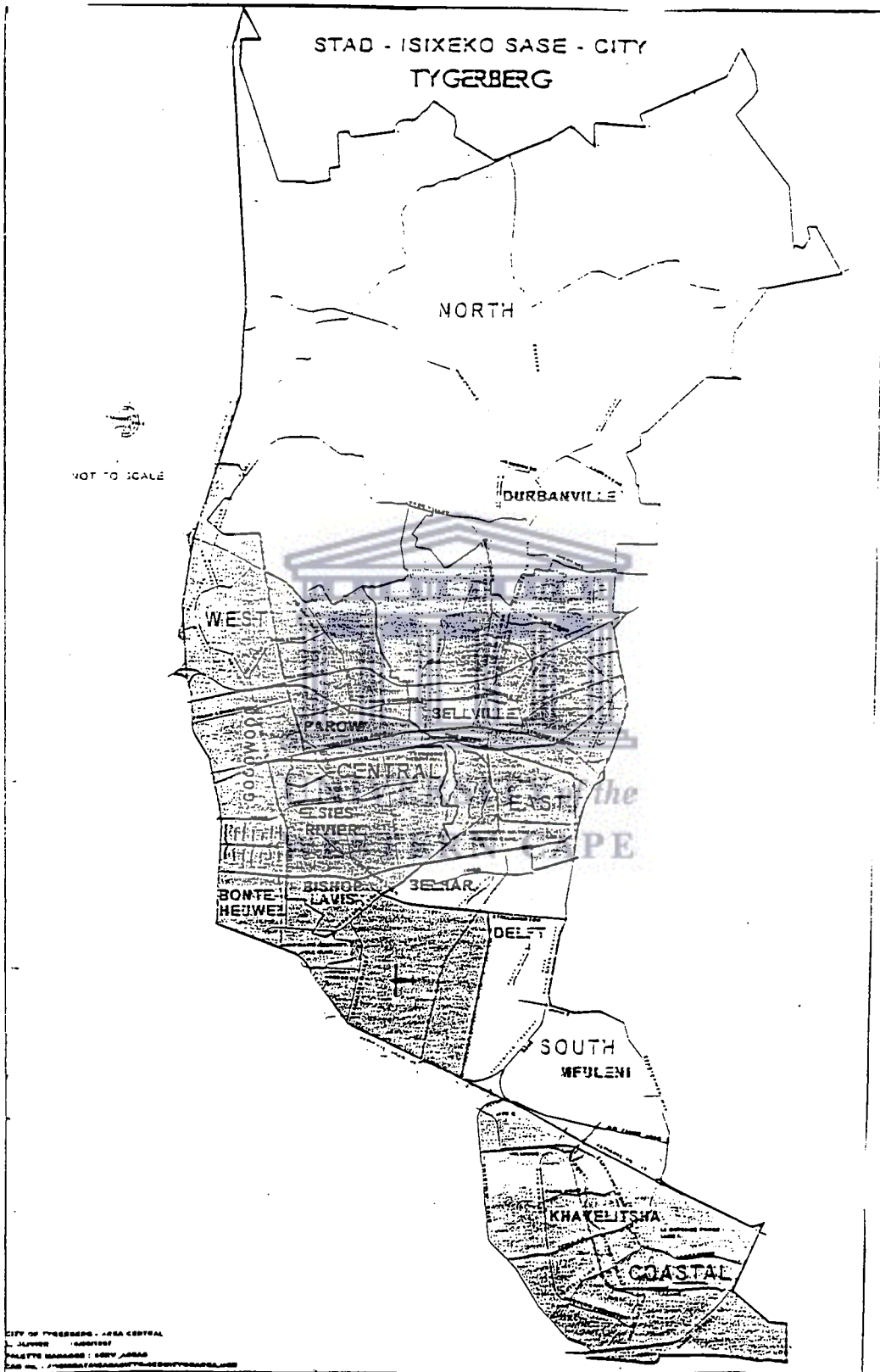
UNIVERSITY of the
WESTERN CAPE

3.10 From the following statements please tick the response you agree with most

Statement	Agree strongly	Agree	Disagree	Disagree Strongly
Water is a basic need required for survival				
Everybody has the right to use water for survival in the same way as the air we breath - free of charge				
All water should be provided free of charge to households earning less than R 1000 per month				
Basic water needs for survival should be provided free of charge to households earning less than R 1000 per month				
Every one should pay the same amount for water used, irrespective of amount consumed (i.e. a flat rate for the availability of the service)				
Every one should pay the same tariff per unit used (i.e. if you use more, then you pay more)				
Household earning more than R 10000 amount per month should pay an incremental tariff on water use in excess of the basic needs amount in order to subsidize water provision to households earning less than R 1000 per month				
It is necessary to regulate the amount of water used by urban households in the Western Cape				
Higher water tariffs per unit during summer and lower tariffs per unit during winter is an acceptable savings measure				
Allowing watering of lawns and gardens on alternate days only (i.e. either odd or even days only) is an acceptable savings measure				
Allowing watering of lawns and gardens during designated hours of the day only (i.e. at night to lower evaporation rates) is an acceptable savings measure				
Prohibiting the washing of vehicles by hose pipe is an acceptable savings measure				
Punishment of fines up to R1000 or imprisoned, or both for transgression of water restrictions is an acceptable savings measure				
Planting indigenous species that do not require much watering in gardens should be encouraged as a savings measure				

APPENDIX II

MAP OF THE CITY OF TYGERBERG



Source: City of Tygerberg - 2000

A Geographical analysis of the
Energy needs, development & the system
of the government electrification in two
low income communities

M. Dyssel

Thesis 333,7932 (Dyssel)

→ Domestic energy consumption pattern in
developing communities with specific
reference to

Thesis 333,790968 (Meyer)

Manderson