

Easing the Water Shortage: The Case of George Local Municipality

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Abstract

It is a well-known fact that water as a basic natural resource is indispensable for life. Income and food of millions of people across the globe are directly dependent on the availability of fresh water. The main focus of this article is on how the George Municipality, in the Eden District, managed its water supplies during the worst drought the area experienced, for the period 2009 to 2011. The article looks at interventions put in place to counter the water shortage problem in order to determine their effectiveness. A qualitative research approach was employed where purposely selected key role-players were given an in-depth interview. The study revealed that the Municipality was not only able to mitigate the impact of the dilemma, it also succeeded in putting measures in place to counter the impact of droughts should such a natural disaster reoccur. One of the key recommendations was to create continuous awareness amongst consumers around water restriction measures and strategies to use water wisely.

Keywords: water shortage, water restrictions, eden district, george municipality, South Africa

INTRODUCTION

The Eden District Municipality which is located in the Western Cape Province of South Africa covers the Kannaland, Langeberg, Mossel Bay, George, Oudtshoorn, Plettenberg Bay and Knysna local municipalities. These municipalities experienced a natural climatological drought from 2009–2011. The compromised water shortage conditions resulted in immediate negative effects for urban areas. Reduced rainfall resulted in numerous consequences to ground and surface water resources that translated into critically low urban water supplies in the Eden District, in particular George, which is the focus area of this study. Over this period the drought conditions necessitated significant emergency responses (George Municipality, 2010). The aim of the article is to forward the results of an empirical investigation which assessed strategies implemented in November 2009 to mitigate water shortages in the study area in order to determine their successes or failures. The study is confined to the Eden District, George Municipality in South Africa in particular and the results cannot be generalised to the entire South Africa per say.

The next section therefore forwards a discussion on the theoretical underpinnings pertaining to water, followed

by a discussion on the research methodology employed, findings, conclusions and finally the recommendations.

WATER AN IMPERATIVE COMMODITY

Water is a basic natural resource, indispensable for life. Although not priced, the value of rain is undisputed. Income and food of millions of people are directly dependent on the availability of fresh water. Since the beginning of human settlement on Earth, water has been used for drinking, sanitation and irrigation purposes. In pre-historic times, humans usually settled in areas of reliable water supplies. During times of drought, however, clans of humans were often forced to relocate in order to survive. Prior to the intervention of humans, the world's water supply remained in a natural state (Pennington & Cech, 2010:13). Fresh water is naturally rare. This fact may at first glance seem surprising. Although two thirds of the earth's surface is covered by water, most of it is salt water found in oceans. Fresh water comprises some 3 per cent of the total, and a large proportion of this is unavailable for use because it is frozen in ice caps and glaciers or locked away as soil moisture (Feldman, 2012:5). Between 1940 and 2000, withdrawal of fresh water has increased more than fourfold, despite improvement in water efficiency. Yet in developing countries the provision of water services still lags far behind the need. Even though many people

in the world still lack basic water services, water scarcity has been increasing in many parts of the world. With the supply of fresh water limited by the dynamics of hydrological cycle, per capita water availability declines as population grows. Increased contamination by population has further reduced supply of fresh water and increased the cost of treatment of available supplies (Lange & Hassan, 2006). According to Pennington and Cech (2010:17) drinking water is the most basic human use for water. Humans can survive eight to ten days without food, but only two days without water. Water must also be safe to drink since poor-quality drinking water can lead to infectious disease. Unsafe drinking water is a daily problem faced by nearly 2 billion people around the world.

WATER SHORTAGES AND SCARCITY: THE SOUTH AFRICAN DILEMMA

Water is often cited as one of the major constraints to development in South Africa. South Africa is a much larger country than Namibia and Botswana with a more varied climate, but its average annual rainfall is still only 500mm. South Africa is projected to achieve the status of acute water stress in the future (Lange & Hassan, 2006:3). Water availability will most likely be further restricted as a result of climatic conditions and increased demand for water resources through population growth, urbanisation and economic growth. Water scarcity is becoming one of the most critical risks threatening social and economic development throughout the world. South Africa is currently classified as a 'water stressed' country. This is largely due to climatic conditions in South Africa in combination with human settlement patterns. South Africa is characterised by relatively low annual average rainfall combined with high evaporation rates. This makes South Africa the world's 30th driest country. Some projections estimate that South Africa already exploits about 98% of its available water supply resources. Water availability will most likely be further restricted in future as a result of climatic conditions and increased demand for water resources through population growth, urbanisation and economic growth (Institute of Directors Southern Africa, 2012).

GEORGE MUNICIPALITY: THE STUDY AREA

Within the Western Cape Province in South Africa there are five District Municipalities (*viz.* West Coast, Eden, Central Karoo, Cape Winelands and Overberg) and the City of Cape Town Metropolitan Municipality. In total, there are 30 municipalities across the Province. Water resources are managed on a catchment scale, i.e. per Water Management Area (WMA); whereas actual water use is aligned according to municipal boundaries (Western Cape Integrated Water Resources

Management Action Plan, 2011). The Mediterranean climate of the Western Cape differentiates it from the rest of South Africa in that it receives winter rainfall and drier summers whereas the opposite is true for the rest of the country. This is due to its latitudinal position in relation to the band of westerly waves of air circulation and the associated low pressure systems. These westerly waves contribute to the climate of the Western Cape, bringing rain in the form of cold fronts (Midgely, Chapman, Hewitson, Johnston, De Wit, Ziervogel, Mukheibir, Van Niekerk, Tadross, Van Wilgen, Kgope, Morant, Theron, Scholes & Forsyth, 2005). The major challenge that the George Municipality was facing was that the municipal area had not received its normal rainfall and this had brought water shortages to the area.



Figure 1: Map of George Municipality

Source: http://www.westerncape.gov.za/your_gov/18

George is very centrally situated, halfway between Cape Town and Port Elizabeth, and is the centre of the Garden Route. It is situated on a ten-kilometre plateau between the majestic Outeniqua Mountains to the north and the Indian Ocean to the south. George is rated among the most popular tourist attractions in South Africa and is popular among both local and overseas visitors for its scenery and moderate climate. The town also has a sophisticated infrastructure with banks, conference facilities, businesses, major shopping chains, transport and shopping facilities, yet it retains an atmosphere of peace and tranquillity. It is a major accommodation centre, with a vast array of facilities on offer to suit every taste and pocket. It has a pleasant climate, conducive to beautiful flowers, lawns, and fruit trees. Botanists and zoologists, over the years, have been amazed to discover the diversity of forest and fynbos. The Touws and Swartvlei river mouths occasionally became silted up and closed when the water did not flow strongly, especially during the dry periods (Nell, 2003).

Eden District's total population is 574 265, representing 9.8% of the Western Cape Province total population of 5, 8 million. George Municipality has the largest population in the Eden District, the population was estimated at 193 672 in the 2011 census, which represents a growth of 29.1% from 2001-2011 (George Municipality, 2013). The undertaking of the South African government is to provide water to the public as it is a basic need. In particular, the *Constitution of the Republic of South Africa, Act No.108 of 1996* (South Africa, 1996) states that water is a basic need that must be provided to all citizens, and that this is the obligation of government. It further states that water must be free from contamination and pollution, and people must have access to clean and good quality water. The *National Water Act No. 36 of 1998* (South Africa, 1998) regulates the use of water in South Africa. The overarching objective of the Act is to ensure the beneficial use of water in the public interest. The fundamental principles of the Act centre on the need for sustainability and equity in the protection, use, development, conservation, management and control of water resources.

The Garden Route Dam (GRD) constitutes the primary water supply for the George Municipality. The sustainability of the George municipal area water supply depends on the seasonal rainfall to fill the dam. This generates expected storage levels, with full storage in the winter months to provide for the water demand in the municipal area. The tight relationship between rainfall, dam levels and water consumption shows the close connotation between rainfall, water consumption and the increase or decrease in the GRD level (Human, 2013).

The responsibility of the Municipality is to monitor the dam level of water to make sure that sufficient water is available for respective areas.

In lieu of the above, the research objectives of the study were to investigate interventions set in place to address the water shortage problem, in particular the implementation of water restrictions; the strategies that contributed to the alleviation of the water shortage; and, lastly, to analyse the effectiveness and performance of the measures set in place to alleviate water shortages.

METHODOLOGY

The study employed a qualitative research approach. This approach proved apt for this investigation as it provides for an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or to interpret phenomena in terms of the meanings people bring to them (Ritchie & Lewis,

2003). One of the data collection tools that may be employed in qualitative research is an in-depth interview. A key feature of in-depth interviews is the depth of focus on the individual. It provides an opportunity for detailed investigation of each person's personal perspective, for an in-depth understanding of the personal context within the research phenomenon located, and for very detailed subject coverage. It is the only way to collect data where it is important to locate the perspective within the context of personal history or experience, and where it is important to relate different issues to individual personal circumstances (Ritchie & Lewis, 2003).

As the above data collection tool proved apt for the study, the researcher conducted in-depth interviews with purposely selected individuals within the George Municipality in July 2014 who holds specific knowledge on water management (restrictions and shortages) and planning professionals to seek professional opinions. It was important that the research be based in the respective departments that will be mentioned so that the results were useful in the George Municipality.

The selected participants were firstly contacted by e-mail and telephonically to request their consent and participation for an interview. Selected participants were from the Water Services Department, Water and Sanitation Civil Engineering Services Department and Disaster Management Services in particular, the Director: Water and Sanitation Services Civil Engineering Services, Senior Manager Operations: Water and Sanitation Services Civil Engineering Services, Marketing Coordinator: Water Services, Manager: Civil Engineering Services, Manager: Water and Sanitation Services Civil Engineering Services, and Manager: Disaster Management Services.

FINDINGS AND DISCUSSION

As indicated earlier, in the Western Cape, the George Municipality resides under the Eden District Municipality. In 2010, the Eden District, in terms of the *Disaster Management Act No. 55 of 2002* (South Africa, 2002), in consultation with the National, Provincial and Municipal Disaster Management Centres, resolved that owing to the drought conditions within the jurisdiction of the George Municipality, the municipal area be declared as a local state of disaster in terms of the Act. This municipal area was affected the worst of all the municipalities in the Eden District. On 10 November 2009, Eden District, George Municipality, was declared a drought disaster area (Western Cape Government, 2009).

The George municipal area was in the grip of its worst drought in 132 years; with the George Municipality facing the prospect of taps running dry. It has become known as the “green drought” – while the area still looked lush and fertile, dam levels were plummeting and rivers slowing to a trickle (Bamford, 2009). From the in-depth interviews by the research participants that were conducted within the Eden District, George Municipality, it was found that the water shortages occurred as a result of low rainfall and introduced water restrictions in the George municipal area starting in January 2009.

The Garden Route Dam (GRD) and the George Municipality

The Municipality of George draws water supply from the Garden Route Dam (GRD). This is the sustainability of the George municipal area water supply and depends on the seasonal rainfall to fill the dam. This dam constitutes the primary water supply of the Municipality. This generates an expected storage level, with full storage in the winter months to provide for the water demand in the municipal area. The provision of water to the George Municipality area is the Municipality’s responsibility. It could be interpreted that the Municipality is responsible for the management of the water levels of the dam and making sure that water is available to water consumers. Due to the fast dropping level of the Dam it was imperative for the Municipality to make the public aware of the shortage of water and the implementation of the water restrictions. The water managers in the water department absorbed the seriousness of the water shortages and plans were implemented for the raising of the Garden Route Dam Wall to collect more water for future purposes and for the futuristic outlook for water shortages. It can be interpreted that the Municipality is in its final stage of licence approval and raising the dam wall. This indicates the ability of George Municipality to act on the seriousness of the water shortage, to extend the dam wall in order for the dam to collect more rainfall for future use. This confirms that the long term project is underway for the raising of the dam wall and that the dam is fairly full.

Water saving appliances

During the interviews with the research participants, it was found that water consumers were made aware of water saving appliances that could be installed to lower water usage. This included, for example, showerheads, and flush toilets that could have been installed or replace existing fixtures and appliances within homes and business. The mechanical irrigation of gardens was prohibited to save water. Gardens were permitted to be

watered during certain periods only, that is, between 19:00 to 21:00. Even numbered households (e.g. 2, 4, 6.....) could only water their gardens Mondays and Thursdays. Uneven numbered households (e.g. 1, 3, 5...) could only water their gardens Tuesdays and Fridays. When the garden hose was used it had to be hand-held.

The interviewees mentioned that water consumers were advised to collect rainwater that would run from their roofs into the gutters of the roof and flow into the water tank for use in the lawn and garden. This would help the municipal area to save water and would also benefit homeowners themselves. The Municipality encouraged the use of water tanks to home owners, especially to the farmers and schools for the playgrounds that consumed a lot of water. This ensured that drinking water was not being used for that purpose. It functioned well for water consumers to contribute to the saving of drinking water and from wasting it on lawns and gardens. It can be interpreted that the water saving appliances initiatives were effective and efficient because they made more water available to water consumers. The result was that less water was lost and more water reached the taps. The less water needed to be supplied and served to water consumers, the slower the dam level was running dry.

Water Restriction Strategies

The research participants in the water department of the Municipality acknowledged that the public awareness campaign was a very important event for the restriction of the water shortages. This was because the water dam levels were depleting fast and water consumers had to be educated on the water restrictions. The reason for this campaign was also ultimately to make the public aware of the water shortage in the municipal area and to reduce consumption of water to prevent further drastic measures. The intention of this campaign was to reduce consumption to a level that prevented further more drastic measures. All possible ways of communication were used, for example, radio, press, television, billboards, posters, announcements in the streets and, with the help of the Municipality, everything was done in its power to accomplish the awareness campaign of water shortage restrictions and water conservation in the George municipal area.

The George Municipality did not receive any water from neighbouring municipal areas, for example, Knysna Municipality or Mossel Bay Municipality. The goal was to manage the situation of the dam so that it would not run empty or dry. The lack of the water inflow into the dam called for the water restriction strategies to be implemented. It was clear that water

consumption decreased by up to 38 per cent from April 2009 to the beginning of 2010 which was a testimony that the awareness campaign contributed positively to the management of the water shortage in George municipal area. During the interpretation of the data above it was found that the water managers were confident that the Municipality was independent under the circumstances of low rainfall and was optimistic in anticipating more rainfall for the increase of water inflow into the dam. It was evident that the municipal area has been restored completely following the water shortages and the Municipality was still encouraging the public or community to be mindful of what was experienced in the past and to save water continuously. The research participants were positive when uttering these words. More measurements, for example, a desalination plant, would also be an improvement to reduce the water shortages in the George municipal area. This also makes a huge impact regarding the water restrictions.

According to Feldman (2012:20-21), one arena where water stress is at its highest is urban areas composed of millions of people. It is this type of conflict of fresh water that may likely be seen more frequently in the future. They are also touchstones for innovations in conservation, waste water re-use and recycling and desalination. It can be interpreted that the water restriction strategies initiatives were real and competent because more water made it to water users. This resulted in more water reaching the taps and less water being lost. The less water needed to be provided and served to water consumers, the slower the dam level was depleting.

Public Water Awareness Campaign

The study found that the George municipal areas were educated on the awareness of water restrictions and the competitions on the radio alerted people and rewarded the listeners. The public was made aware physically and mentally in relation to the water restrictions. The interviewees had a very positive attitude towards the above mentioned being implemented. This campaign was successful and showed optimistic results. There was a great deal of convincing the George municipal area about the importance of saving water. It was mentioned that this awareness campaign was essential because the public or community often did not have an understanding of how much water they use and how valuable it is. To change this, public education was needed to change public perceptions and behaviour toward water conservation.

The changing of the public's thinking about water conservation and productivity therefore was gradually

achieved by many people in the municipal area and the water consumers already had some idea, understanding and knowledge of the issues involved, for example, home-owners were not allowed to use a hosepipe to water the garden at a certain time of the day or on a particular day. This confirms that public awareness was needed to change these perceptions as well as to change personal behaviour of individuals towards saving water. This education awareness included information about water shortages, restrictions and conservation. It helped individuals to realise their effect on the water shortages and it helped individuals to understand the measure implemented to alleviate water restrictions. It was found that social marketing was a method of changing the perception of water consumers and educating the public about water restrictions in the George municipal area.

It was stressed by the research participants that an aggressive social marketing awareness campaign was conducted at the community level and was connecting with individuals, residents and the neighbours. The social marketing campaign included community events to promote water conservation, for example, road shows. Educational material (e.g. pamphlets and guides on saving water in homes) was made available and distributed widely in the community and the George municipal area. The public awareness campaign that was implemented by the George Municipality reduced the water consumption in the municipal area. According to Low (2005) capacity building for needs in education, training and raising awareness include the public at large. This has proven that the campaign was successful.

Water Restriction Mitigations

The interviewees were able to provide a host of water shortage restriction advice about how to implement water restrictions measures successfully to alleviate the water shortages. A host of knowledge and understanding of the importance of water restrictions was deemed to contribute to water conservation. A very significant section of advice was to do simplistic and small changes to save water first. Even though some water restriction implementation plans took a longer time to materialise and to see results, they required making tough decisions and were very difficult to implement. There were many other approaches that also could have achieved significant results in a relatively short period of time and been easy to implement.

Firstly, the implementation of water restriction plans with relatively simplistic methods created fast results with significant decrease of water shortages and confirmed the benefits of water restrictions to those who would not support it. This provided motivation for the plans for water shortages and included the more difficult

and long term plans (e.g. raising the Garden Route Dam wall) that were required to achieve true sustainability.

Secondly, it was normal that most people did not want to change their habits and behaviour. The George Municipality had some difficulty to convince these types of water consumers. This was in the case of water consumers who were set in their normal way and believed in the way individuals consumed water. It was mentioned by the interviewees that water consumers with high consumption were often the ones that found it hard to break their habits. These water consumers were so use to abusing water consumption that it was so to speak second nature without thinking of their water usage. An example was when men are shaving and they leave the tap running when rinsing their razor. All these bad habits contributed to the traditional ways of wasting water and make it difficult to change it. Grey water, also called recycled water, was suggested to households as a potential way to recycle water for household uses or purposes and not as drinking water. According to Harding (2011), grey water could be used for other purposes, for example, watering the garden instead of using and wasting drinking water. It was evident that this confirmed the contribution of saving water and water restriction mitigation.

Lastly, the Municipality does not have control over the informal settlement but has managed to come up with an initiative to control water losses in the area by means of push type taps to reduce the water losses. The perception of the right of water as mentioned in *The Constitution* leads many people to think that they have the entitlement to use and waste as much water as they want, which is a perception that must be overcome by the public. All were possibly prepared to implement water restrictions for the alleviation of the water shortage, saving of water and the high consumption thereof. Although difficult water consumers changed their mind-set on high water consumption and joined in with the plan, they seemed to understand that water conservation could also result in more water being shared with more water consumers. The following theme also helped water consumers to stay in line with water restrictions.

Water Emergency Tariffs

The senior manager of the water department mentioned that the Municipality employed water emergency tariffs to address the water shortage disaster in order to mitigate the impact thereof. This took the form of a progressive water tariff that increases for blocks of water usage. Due to the situation, water consumption had to be managed to extend the life of the water resources in order to meet the basic water requirement

for the residents of the George municipal area. It was running out of water and the water consumption levels continued to deteriorate. This was when the emergency tariffs were implemented to prevent the water levels from deteriorating so rapidly. It shows that the Municipality was ready and was aware of the water shortages.

The way it was managed was that water usage over 15 kilolitres per month was charged at an emergency rate when the dam reached 25 per cent. In the case of all other tariff groups (car washes, dry cleaners, industries with a consumption of more than 100 kilolitres per day, farms/rural areas, educational institutions, welfare organisations, religious institutions and municipal buildings), tariffs were increased by an additional fifty per cent (50%) for the usage. Should the Garden Route Dam reach a level of 15% then the minimum usage of water consumption will be reduced to 10 kilolitres per month. The Council decided on more stringent measures when the dam level was depleted and the Municipality adjusted the tariffs upwards. The Municipality does not have control over the informal settlement but has managed to come up with an initiative to control water losses in the area by means of push type taps for communal purposes to reduce the water losses. During the interview the senior manager confirmed that this was a mechanism that worked very well in the water restriction period to manage the shortage of water.

Because the right of water as described in *The Constitution* has led many people to think that they have the entitlement or right to use and waste as much water as they want, people's thinking needs to be challenged and changed.

In so doing, the heaviest water users would be penalized and lower water users would be rewarded and this created an incentive for water consumers to use less water.

Climate Change in the George Municipality

During the interviews with the water service managers, it was mentioned that climate change has to do with conducting a long-term planning for water restriction and water consumption in the George municipal area. It was confirmed with the water service managers that water restrictions are a means to adapt to the potential effects of future climate change in the municipal area. According to them it was acknowledged that the George municipal area was likely to have longer, drier summers in the future. Should water shortages occur again and it results in a drought, the measures set in place to alleviate water shortages will mitigate the likelihood or severity of water restrictions in the future. The water

service managers confirmed that the measures were fully incorporated into the long term water master plan and water demand management strategy. It would give the Municipality the means to take a more holistic and comprehensive approach on water shortage.

George Municipality's Drought Policy

The research participants explained that water restrictions were implemented in April 2009. A council resolution was taken that restrictions will be imposed if the dam level reaches 60 per cent. The restrictions have been intensified on three occasions since then and a decision was made to implement emergency tariffs if the volume of water in the dam reached 25 per cent. The George Municipality therefore has a Drought Management Policy in place to address possible future drought or water restriction situations, periods of low rainfall, or insufficient raw water resources to address the needs of the residents of George municipal area. The Municipality has a drought policy in place and this was approved by council on 25 November 2010 for future purposes and outlooks. Most of the water restrictions items have been covered in this policy. The Municipality also adhered to and complied with the requirements from the Western Cape Provincial Government to adopt this policy. In essence the Municipality has all aspects in place and is ready for this unexpected occurrence. It was confirmed that the Municipality achieved a drastic drop over the 2009-2011 water shortage periods. It can be confirmed that this drought policy prevented potential shortfalls in the supply of water.

Sources of Funding to Alleviate Water Shortage

The research participants responded that the Eden District Municipality allocated funds towards the projects. The measures implemented to alleviate water shortages were a priority to the George Municipality mentioned by the interviewees. The research participants indicated that funding was a concern to finance the water shortage strategies and mitigations. Maintaining the awareness campaign and emergency projects financially was important because of limited municipal budget. These water awareness campaigns and projects had to be as efficient as possible to get the maximum benefits and had to find sources of funding whenever possible. Funds were provided by the Eden District Municipality for projects, for example, the boreholes. This confirms that the Eden District Municipality in conjunction with the George Municipality worked together to provide funding for the water shortage projects. The total cost of the funds was allocated toward the projects with a shortfall of funds. The balance of the funding was financed from the

savings on the existing capital budget and loans in the financial year 2009/10.

Another impact of the water restrictions was the resultant lower water sales and the reduced income for the financial year. The shortfall as well as the resultant cost of the loans was financed from higher water emergency tariffs. The council of the George Municipality has approved both the taking up of the loan and the adjustment of tariffs in a financial year. The financial implication was under control to finance the disaster between the National, Provincial Treasury and the Local Authority (George Municipality). The Municipality had capital savings to contribute to the disaster and also an external loan to settle the shortfall. One concern the research participants had was that the community had to carry the burden of higher tariffs to pay for the external loan that was taken up by the Municipality.

CONCLUSION AND RECOMMENDATIONS

This research was a study on the water shortages that occurred in the George Municipality and how the measures or restrictions were implemented to counteract the water shortages. The problem in essence encompasses the assessment of the shortages of water and the interventions set in place to address the problem, particularly the implementation, and the essential strategies and mitigations that contributed to the alleviation of the water shortages. This study presented, analysed and interpreted data that was collected from the use of in-depth interviews. It presented the research findings and was accompanied by interpretations of the water shortages and interventions for this investigation.

An analysis of the measures implemented to alleviate the water shortage was addressed. The findings revealed that the measures implemented to counteract the water shortages were positive in the municipal area. The assessment indicates that it did not only mitigate the impact of the dilemma, but the Municipality is in a position to have a strategic futuristic outlook should this natural disaster reoccur. Also, the intention was to reduce water consumption to a level that will prevent further more drastic measures for as long as possible.

The researcher recommends that the George Municipality should continue to market water restriction awareness campaigns to the public even though the George municipal area is no longer experiencing water shortages. This task should be continued and managed by the senior manager of the water department: water services and sanitation, which is the coordinators of this process. This process could be marketed or advertised

on a quarterly or bi-annual basis in and on social media. It should be noticeable with social media in the municipal area, for example, on the local radio station: Eden FM and Billboards and in the local newspaper: George Herald local newspaper as a friendly reminder to respect water consumption and conservation thereof.

It is recommended that short term water restriction strategies and mitigations, for example, the simplistic methods should be concerned with the implementation of long term water restriction strategies and mitigations (Raising of the Garden Route Dam) by the George Municipality. The short term and the long term strategies and mitigations should run concurrently. For example, as the short term strategies and mitigations are working to reduce water consumption, the long term strategies and mitigations should work on raising the Garden Route Dam. This indicates that the task of the Senior Manager and the Water Marketing Coordinator in the water department should work closely to update or communicate with each other on the status in short and long term water status. This will keep them abreast when comparing the two variables. These strategies must work simultaneously together to reach their common goal by saving water, collecting water and making more water available to more water users.

The George Municipality needs to review the Drought Policy on an annual basis (at the start of the financial or fiscal year) in order to keep track or abreast of and remain relevant to the ever changing population growth, climate change, water consumption, water restrictions, needs and dynamics in the George municipal area. This must be reviewed by the Chief Financial Officer, Senior Management and the Council of the George Municipality in conjunction with the relevant legislation and regulation frameworks, for example, the Municipal Financial Management Act (MFMA). The Municipality should continue to build relationships with water experts, for example, Ninham Shand (Aurecon), for bulk water planning, sources of funds and the establishment of an early warning system against water scarcity as mentioned in this study. Therefore it is recommended that the senior manager of the water department should concentrate on risks (delay in water projects) and early warning signals (climate change) for water shortages conditions. The way forward is for the senior manager of the water department to continue to strengthen the alignment of the water restrictions to climate change as discussed in this study.

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