

## IMPROVING AWARENESS OF THE WATER CRISIS IN SOUTH AFRICA

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**Abstract:** *Water conservation continues to remain a priority on the international agenda. It is therefore all the more important that we continue to do as much as possible to conserve our already scarce water supply. This research aims to quantify the current awareness levels of the water crisis in South Africa. All one hundred members of staff at a faculty at one of the leading tertiary education institutions in the country formed the population for the study. Data collection took place through questionnaires, with a response rate of 25%, after which a quantitative analysis took place. The research found that a fair level of awareness does exist regarding the water crisis in South Africa, despite the fact that people are largely unaware of existing awareness campaigns. People are however willing to learn more and to become more responsible water users, as they have shown an interest in receiving more information. Although current awareness campaigns do accomplish a fair bit, future research should focus on not only maintaining these campaigns, but also on improving their efficiency and reach. Increasing the awareness and acceptance of the virtual water concept can also have far reaching implications for water scarce countries.*

**Keywords:** *Water conservation, awareness, responsible water usage.*

### 1. INTRODUCTION

In recent years it has been widely recognised that water was managed with little regard to the efficiency of its utilisation and with no or very little effective pollution control (Pallett, 1997). South Africa has limited fresh water resources and budgets for the supply of basic infrastructure services, and is classified as a water-stressed country as it has less than 1700 m<sup>3</sup> of water for each person per year (Rand Water, 2008). Several million people in South Africa do not have access to even a basic level of water supply or have only a very limited level of access (Cullis, 2005). The water poverty situation is further worsened by unawareness of the water scarcity situation and through irresponsible usage. According to Smajgl, Larson, Hug & De Freitas (2010), improving human capital through education and increased awareness will have long term benefits for individuals, communities, management systems and ecosystems.

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## 2. THE SOUTH AFRICAN CONTEXT

South Africa is a water-stressed country (Rand Water, 2008). Water stress is an indicator that is commonly used to measure the degree of water resources vulnerability, and typically occurs when the demand for water exceeds the supply (Perveen & James, 2011). Water stress causes deterioration of fresh water resources in terms of quantity and quality, and a reduction in water quality will eventually lead to a decline in public and ecosystem health, placing further stress on already scarce financial resources (Smajgl *et al.*, 2010). Water scarcity occurs when a large number of people in an area do not have access to safe and affordable water to satisfy their needs for drinking, washing or their livelihoods for a significant period of time (Rijsberman, 2005). Rand Water (2008) warns that if South Africans do not learn how to use their limited water supplies wisely, they will move into a water scarcity category – that is, less than 1 000 m<sup>3</sup> per person per year – by 2025. The World Bank estimates that globally roughly 166 million people in 18 countries are affected by water scarcity and another 270 million people in 11 countries are water stressed (Hemson *et al.*, 2008). According to Wilk & Jonsson (2013), participatory methods and specifically stakeholder participation are crucial to determine amongst others, the adequacy of local services, as accurate information as possible, and to help implement solutions where they are in fact the most urgently needed. Awareness of the problem is only one of the ways in which more responsible water usage can be fostered, although it can be argued that it will have a significant impact. Water resources are our most valuable natural resource, as it is fundamental to social and economic wellbeing (Smajgl *et al.*, 2010)

In 1994 the Reconstruction and Development Program (RDP) was initiated, which listed “*meeting basic needs*” as one of its five broad programmes (Melville and Goddard, 1996). Some of the areas that were highlighted in the RDP as being extremely relevant, and therefore in need of research include, amongst others:

- Water, including its provision, sanitation and conservation.
- Social welfare.

This research, either directly or indirectly, assists in addressing both of these areas.

## 3. RESEARCH METHODOLOGY

Under the quantitative methodology researchers use the scientific method, which starts with the specific theory and hypotheses, and then quantitatively measure and analyse based on established research procedures (Swanson *et al.*, 2005). It typically consists of five steps which include:

1. Determining the basic questions to be answered by the research. In this research to quantify current awareness levels of the water crisis in South Africa.
2. Determining the participants in the research. Quantitative research benefits greatly from generalizability, or being able to draw conclusions about a population from sample data. The members of staff in a faculty at one of the leading universities in South Africa form the population for this study.
3. Selection of methods to answer the research questions. Data will be gathered through the use of questionnaires.
4. Selection of statistical analysis tools for analysing the collected data. Performed using the built-in tools available in Microsoft Excel.
5. Performing the interpretation of the results of the analysis based on the statistical significance determined.

The advantages of a case study as a research strategy include (Denscombe, 2003):

- It allows the use of a variety of research methods.
- It is suitable for when the researcher has little control over events.
- Suitable to both theory-building and theory-testing research.
- It allows the researcher to deal with the intricacies of complex situations.
- It fosters the use of multiple sources of data.
- Concentrates effort on one research site.

The personnel of a specific faculty at one of the leading tertiary education institutions in South Africa formed the target population for this research. No sampling took place as questionnaires were distributed to all the members of staff in the faculty. The questionnaires highlighted that participation was completely voluntary, and that results will only be used in a summarised format and for research purposes. The questionnaire consisted of mainly multiple choice questions, the majority of which used the 5-point Likert scale, with two open ended questions at the end. A pilot study was run among the senior members of staff in the faculty, after which the questionnaire was refined before distribution. A 100 members of staff were contacted which returned a response rate of 25%.

#### **4. WATER MANAGEMENT**

During recent years some of the major shortcomings of national water management that have been widely recognised (Clarke and King, 2004; Langford, 2005; Meyer, 2007; Pallett, 1997) include very little or no pollution control, and inefficient

utilisation. According to Pallett (1997), the aim of water management should be to supply people with essential water supplies while ensuring that water continues to be shared among all the components of the human and natural environment in a river basin. The importance of good water management is vital in determining the water fate of the majority of the world's population (Clarke and King, 2004). According to Smajgl *et al.* (2010), various stakeholders are realising the need for tools to be developed that could generate recommendations for improved governance mechanisms. Ideally these tools should link geographical scales and bridge sectoral divides, while sustaining both human livelihood and biological diversity.

Management is one of the major problems in the global water sector (Ahmad, 2003), and according to Langford (2005), the reasons why we currently find ourselves in a water and sanitation crisis are:

- Insufficient and decaying infrastructure for water service delivery, especially in deprived rural and urban areas.
- Insufficient capacity and funding for the expansion and maintenance of water supply systems.
- Pollution of traditional water sources, particularly from industrial waste, agricultural runoff and human and animal waste.
- Reduced access to, and depletion of, water resources due to drought, population growth, armed conflict and the dominance of commercial agricultural and industrial activities.

Many researchers (Ahmad, 2003; Cullis, 2005; Sullivan, 2002) suggest that a shift of emphasis to a more holistic approach to water management is necessary. As a first step, the concept of an Integrated Water Resource Management (IWRM) as a holistic approached-based framework for water management was introduced. This approach focuses on poverty reduction and sustainability of ecosystems among other things; in other words to achieve a sustainable water world. The Global Water Partnership (2000:15) defines IWRM as "*a process which promotes the co-ordinated development and management of water, land, and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems*".

At the United Nations (UN) Conference on the Environment and Development that was held in 1992 in Rio de Janeiro and at the Dublin Conference also held in 1992, IWRM was a major item on the agenda. During the UN conference the various stakeholders came up with an action plan for the world environmental crisis, called Agenda 21. Under this agenda, the four main objectives of IWRM are (Pallett, 1997):

1. To plan the sustainable and rational utilisation, protection, conservation and management of water resources.
2. To identify and strengthen or develop, as required, in particular in developing countries, the appropriate institutional, legal and financial mechanisms to ensure that water policy and its implementation are a catalyst for sustainable social progress and economic growth.
3. To promote a dynamic, iterative, interactive and multisectoral approach to water resources management.
4. To design, implement and evaluate projects and programmes that are both economically efficient and socially appropriate within clearly defined strategies.

Unfortunately, according to Swatuk (2010), although supporting the principle of IWRM, South Africa will experience some difficulties in realising the ideals of IWRM in practice. Examples of some of the contributing factors to these expected difficulties include:

- The loss of more than 1000000 jobs in the first post-apartheid decade, which had resulted in major economic implications.
- Fault lines that have appeared within and between the major political parties.
- Capital flight and the out-migration of skilled workers to other countries, which limit the capacity of the state and society to shift toward more efficient, equitable and sustainable processes of wealth creation.

South Africa has however been an active country in IWRM and IWRM research since the approval of the National Water Act in 1998, which has its main foundations in the IWRM concept (Gallego-Ayala, 2013). This has caused several successful actions to be documented as well, namely (Swatuk, 2010):

- Free basic water provision for all.
- Improved demand management through progressive tariff and taxation policies, removal of alien species, leak detection and repair in urban areas, etc.
- Incentives for farmers and industry to move towards more efficient water usage.

Hemson *et al.* (2008) have analysed many years of work and development in the global water sector. This analysis has led them to compile the following set of guidelines, which, when adhered to, will greatly improve the effectiveness of any water management entity's efforts:

- Set lower goals, as sufficient funding will not be available, rather than argue strongly for more resources.
- Emphasise the very simplest level of technology with wells and village hand pumps to make local water resources more available to the poor within existing budgets.
- Place responsibility first on communities and second on national governments rather than on international organisations.
- Place the responsibility for initial capital resources on communities and require communities to be responsible for operations and maintenance.
- Make water provision an aspect of community development rather than a public health issue.
- Seek ways in which more can be achieved with more or less the same financial commitment by fixing systems rather than providing greater funding.
- Pay greater attention to the role of women in managing water resources and benefiting from delivery.
- Stress better utilisation of water to improve health conditions, for example personal hygiene and proper sanitation.

Perhaps one of the most well-known examples of poor water management relates to the Aral Sea in Kazakhstan and Uzbekistan. The Aral Sea has shrunk by 66% in volume and by 50% in area since 1957, due to the diversion of two rivers that used to feed it for irrigation by the 1960's Soviet government (Clarke and King, 2004). The water level of the Aral Sea has dropped by more than 13 metres, and its mineral content has increased fourfold, which has effectively killed off the entire fish population. It went from a sea supporting 60 000 fishermen in producing 40 000 tons of fish, to a poisoned wasteland with no fish production. About half the populations of the once seaside Aral towns and villages have fled, leaving the people who were forced to stay in a constant battle with a deadly mix of pollutants. The infant mortality rate in the Aral region is among the highest in the world (Clarke and King, 2004).

## **5. DEMOGRAPHICS OF THE POPULATION**

As mentioned previously the response rate for the questionnaire was 25%, 25 respondents. Figure 1 illustrates the age distribution of the respondents, with all four groups fairly well represented. Just over 60% of the respondents were female, which is also a fairly good representation of both genders.

**Figure 1: Age of the respondents**

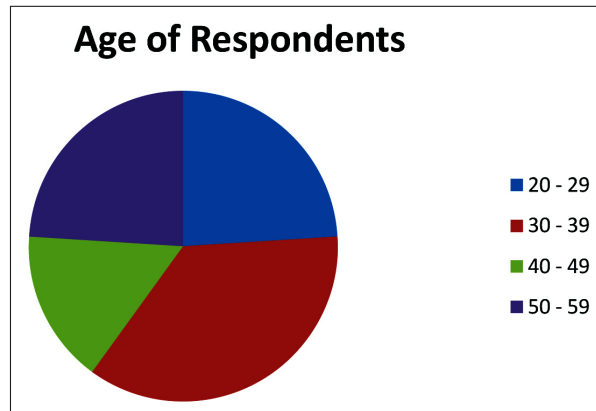
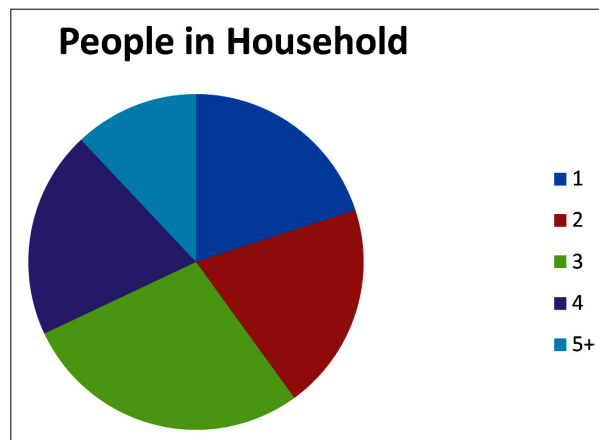


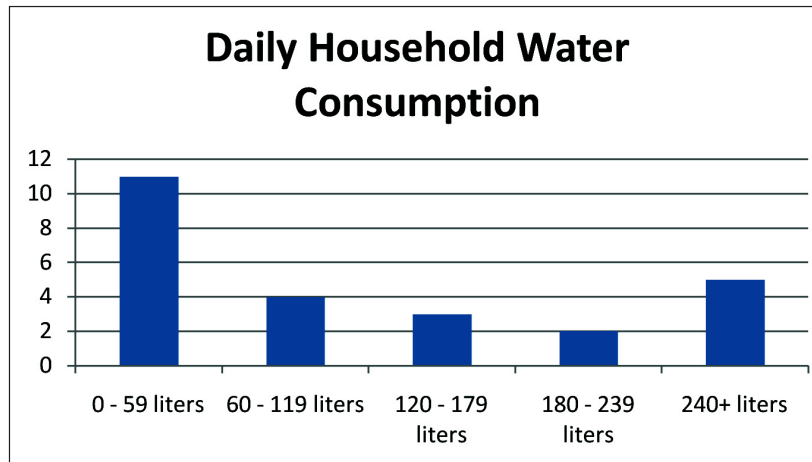
Figure 2 illustrates the number of people in the households of the respondents. Out of the 25 respondents almost 80% indicated that they consider themselves and their households to be responsible water users.

**Figure 2: Number of people in each respondent's household**



Close to 70% of the respondents indicated that they have received information regarding responsible water usage in the past. This is represented to a certain degree in figure 3, which illustrates the daily household water consumption in the homes of the respondents. Keep in mind though that the low usage figures might be due to underestimation. There is however no correlation ( $r = -0.18$ ) between perceptions of being responsible water users and having received information about responsible usage in the past.

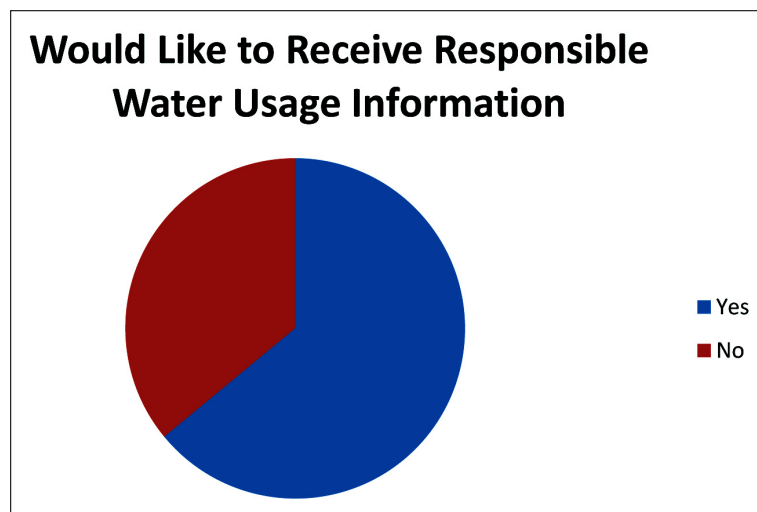
Figure 3: Respondent's Daily Household Water Consumption



## 6. FINDINGS

Understanding people's current perceptions is crucial in planning for the future. These perceptions were documented by Van der Vyver (2014), and highlighted that there is severe scepticism regarding long term supplies for both South Africa and globally. It can be argued that this scepticism has created a certain level of awareness, and therefore a willingness to learn more about responsible water usage, as seen in figure 4.

Figure 4: Would Like to Receive Responsible Water Usage Information

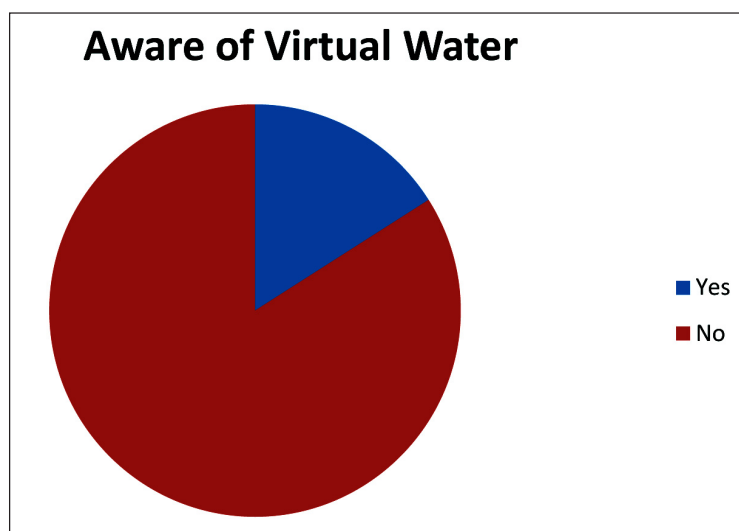




When considering water conservation and water usage it is important to also consider virtual water. Gialis & Mavroudeas (2014:61) define virtual water as “the particular amounts of water that are embedded in the production of both natural and manufactured goods”. The virtual water content is usually estimated by studying the entire production value chain and by calculating the amount of water needed to complete the process across different spatial entities. For example in rain-fed and favourable climatic conditions it takes between 1000 and 2000 kg (or 1 or 2 m<sup>3</sup>) of water to produce 1 kg of grain, whereas this can increase in arid countries with unfavourable climatic conditions to between 3000 and 5000 kg (Hoekstra & Hung, 2002). It therefore stands to reason that as far as possible water-rich countries should produce water-intensive products for export to water-poor countries, and that water-poor countries should limit production of these products. According to Hoekstra & Hung (2002) South Africa is a net importer of virtual water with a net import of  $21.8 * 10^9$  m<sup>3</sup> for the period of 1995 – 1999, and as mentioned earlier this is ideal given its current classification as a water-stressed country.

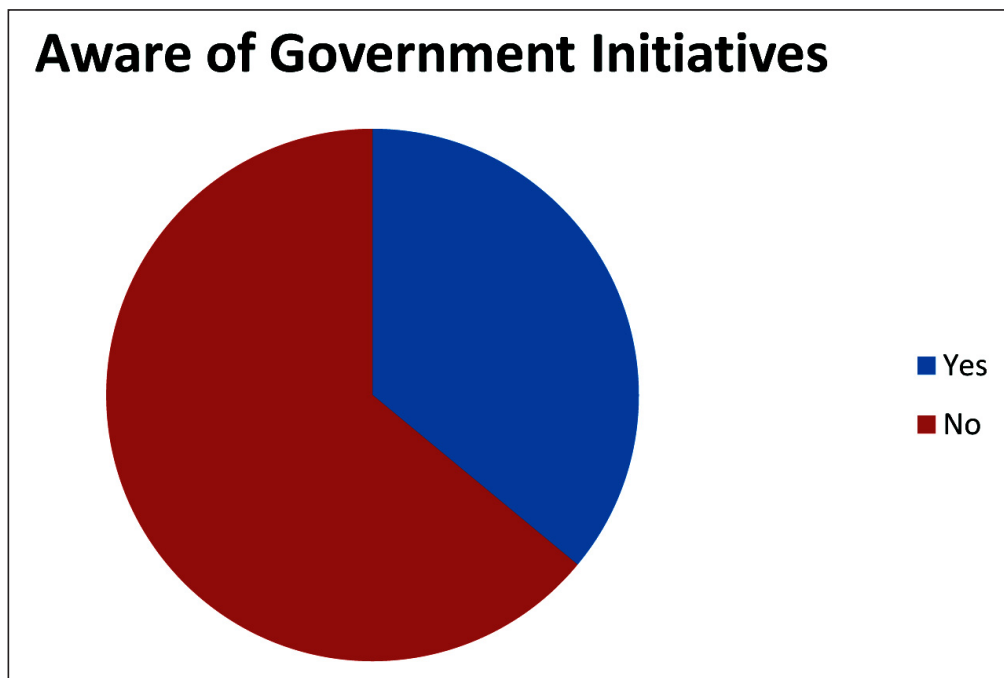
The typical water consumer tends to think of their water consumption only in terms of the water they get billed/charged for, as can be seen in figure 5. If more consideration is given to the virtual water contained in their consumption, it can be argued that it will have a positive impact on their water usage. Increased virtual water awareness of individual entities will eventually influence entities which do have direct control over virtual water, whether through imports or exports, to reconsider their impact on the environment.

Figure 5: Aware of the concept of Virtual Water



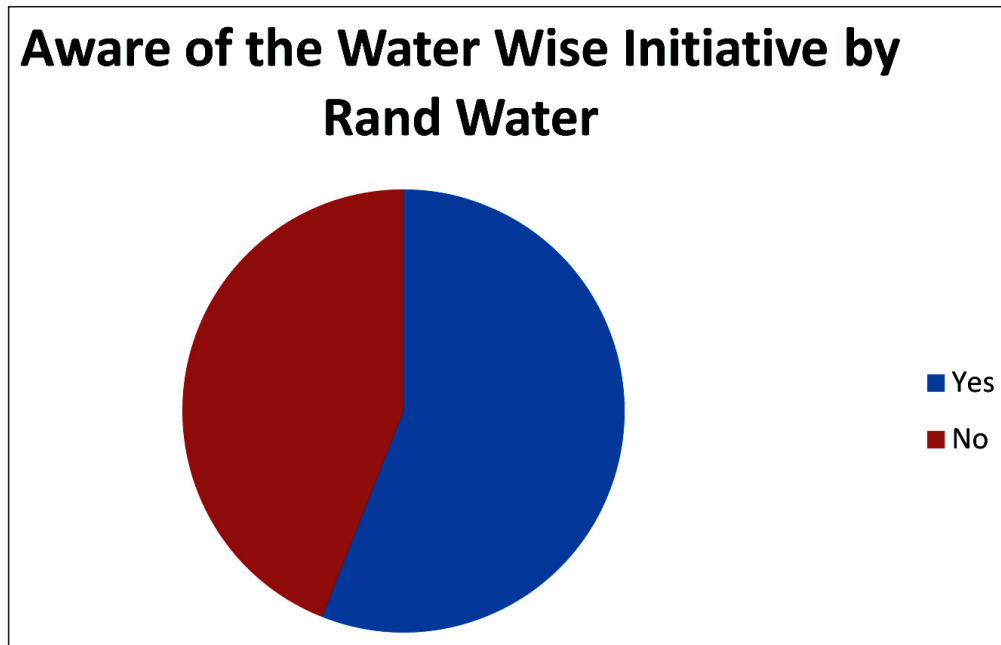
In South Africa provision is made for 6 kilolitres of free water per household per month (as mentioned in section 4). This is based on the World Health Organisation's guideline that each person requires 25 litres of water per day to ensure healthy living, where the average from the respondents was 31,2 litres. Based on a countrywide average of 8 people per household, it equates to 25 litres \* 8 people \* 30 days = 6 000 litres. The majority of households in the country receive this allocation (Emfuleni Local Municipality, 2010), but limitations to full implementation are for example unmetered stands, flat rate billing, no supplied water service, etc. Figure 6 illustrates the level of awareness of the respondents regarding the free water initiative from government, despite its implementation having started in 2001.

Figure 6: Aware of Government Initiatives



Water Wise is Rand Water's environmental brand and is aimed at increasing awareness of the need to value water and to use it wisely (Water Wise, 2014). Rand Water is one of the bulk water service providers in the country and also the provider to the municipalities of the respondents. The Water Wise campaign has been running for just over a decade. Figure 7 indicates the awareness of the respondents of the Water Wise campaign.

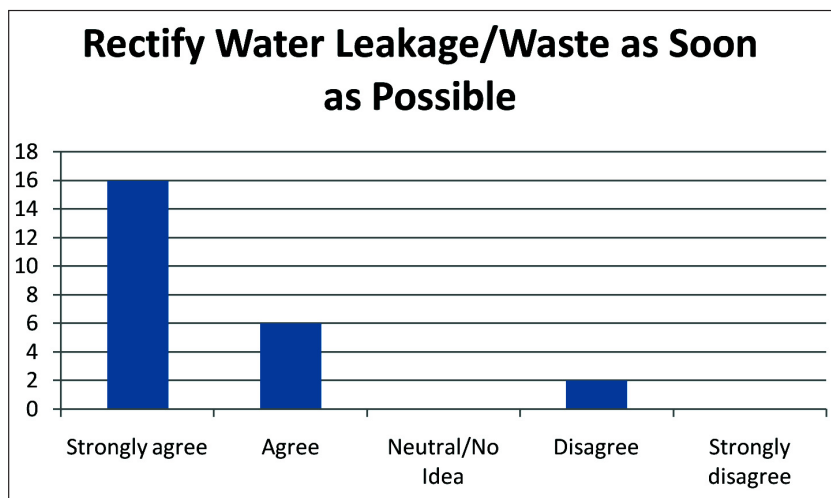
**Figure 7: Aware of the Water Wise Initiative**



When asked about their water consumption habits the respondents gave mixed responses. There was an overwhelming response stating that mankind should change their water consumption habits to ensure future supply, with no neutral or negative responses. However, when asked whether they should change their own habits 64% indicated they believe their consumption is sufficiently low, 8% returned a neutral response, and only 28% believed they needed to change their own consumption habits. This is quite alarming as people seem to be aware that change is needed, but seem unaware of the impact that they as individuals can have.

Figure 8 supports the notion of a high level of awareness as the majority of respondents indicated they rectify water leakage/waste as soon as possible. It could also explain why several respondents felt that they do not have to change their own consumption habits, even though we need to continuously reduce our water consumption due to population increase, increased need from industry and agriculture, etc. Several respondents also mentioned water saving techniques they personally utilize, amongst which were showering instead of taking a bath, using waste water to water the garden, using borehole water as much as possible, and one respondent even mentioned that they are considering installing a reservoir in their yard.

Figure 8: Rectify Leakage/Waste as Soon as Possible



## 7. CONCLUSION

Even though awareness of the global water crisis is on the increase, there is still much that can be done to try and ensure future supply, especially in the South African context. The government initiative of free water provision had awareness of only 38%, despite having run for 13 years, and the bulk water service provider's initiative had awareness of almost 60%, having also run for more than a decade. Despite a certain level of awareness existing, the respondents indicated that they would like to receive more information on responsible water usage and conservation. It is this willingness to learn more that should be acted upon by those in the position to do so.

Future research should focus on not only maintaining current awareness campaigns, but also on finding cost effective ways on expanding their reach and effectiveness. The concept of virtual water is also worthy of research and development as once it has more merit it can play a significant role in ensuring that water is used as efficiently as possible, especially in water stressed/scarcie countries.

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