Awareness of the National Water Act requirements within the Viljoenskroon rural farming community in the Free State Province

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PREFACE

The discrepancies of compliance with the National Water Act within different sectors of the Viljoenskroon Rural Farming Community interests me, and therefore I have undertaken this investigation.

I would like to acknowledge friends, family and all the others who have supported me in completion of this mini-thesis. I am proud to have succeeded. I often wanted to give up but have been encouraged not to. Thank you.

ABSTRACT

The aim of this research was to measure the awareness of the Viljoenskroon rural farming community of the Section 21 requirements of the National Water Act. The National Water Act has specific regulations regarding the Section 21 water usages and the relevant applications and licensing. The Literature and Research on environmental awareness has revealed that the implementation of legal requirements is only possible if individuals are aware of what is required of them.

For this study, the main objective was to assess and measure the awareness levels of the National Water Act by the rural farming community in the Viljoenskroon area. We looked at knowledge and skill of the individuals within the defined farming community, in order to determine the level of awareness of the National Water Act.

The tools used are for studies performed to measure awareness in the Baltic Sea area, India and the IUCN Programme Office for the Southern Caucasus. An individual structured interview questionnaire was used. The questionnaire looked at demographic information, activity baselines, National Water Act awareness, awareness of the Impact of farming on the environment, and water challenges of farmers.

The questionnaire provided relevant and valid data which showed that the individuals in the community have little or no knowledge of the National Water Act. It is noted that often they had specialists who dealt with aspects related to water usage.

The information collected may be useful to determine a method for the relevant departments to initiate programmes to ensure that the legal requirements of the Section 21 water uses be implemented. Further to this, general information about The Water Act could be made available to the general public.

KEYWORDS: Environmental awareness; National Water Act

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CHAPTER 1 INTRODUCTION

1.1 Introduction and Problem Statement

Globally, water is a priceless commodity. Water is the source of life. Without it, existence and survival of species is not possible. South Africa has many water resources challenges. Water has a complex interdependence with both human and natural activities and processes. Therefore South Africa has a complex approach to water usage for different activities. South Africa receives well below international average rainfall, the distribution of which is uneven. There is high water loss through evaporation from reservoirs, conveyance systems, and water mismanagement (Van Wyk, 2015; Swatuk, 2010).

The National Water Act No 36 of 1998 (NWA), has defined principles ensuring sustainable water use. The NWA focuses on international environmental law which promote sustainability as a key principle. Other principles are relevant: the precautionary principle, polluter pays, and duty of care, which looks at the project lifecycle and the integrated and holistic approaches (Meyer, 2015). In terms of the national awareness context, there are multiple companies, and individuals who are not aware of the requirements of the national water act. The awareness needs to be investigated at a local level to understand what information is required to increase awareness among individual communities.

Within the NWA, there are specific provisions directly relevant to the rural farming community of South Africa:

- Schedule 1: Permissible water use for personal use
- Existing Lawful Use: previously authorised
- General Authorisation: Activities that need to be registered
- Licensing (Section 21 water uses)

However, anecdotal evidence suggests that the rural farming communities are not always aware of the requirements of the NWA. Moreover, recent drought conditions have placed increased pressure on rural water resources, prompting new water infrastructure and abstraction of increasingly dwindling water resources. This research aims to explore the extent to which the rural farming communities are aware of the requirements of the NWA, with particular reference to Section 21 water use licencing requirements.

The Viljoenskroon rural farming community in the Free State Province is identified as an ideal region in which to explore awareness of the NWA. The outcome of the research may shed light on ways to promote the implementation of the NWU within the rural farming community in South Africa.

1.2 Research Aim

In light of the problem statement in the previous section the aim of the research is to determine the awareness of the farming communities with regards to requirements of the NWA.

1.3 Research Objectives

In order to achieve the above research aim, the following research objectives were identified, namely;

Objective 1: To determine how awareness should be understood (Literature review)

Objective 2: To identify relevant provisions of the NWA which have direct relevance for rural farming communities (Literature review)

Objective 3: To determine the extent to which a specifically selected farming community (the Viljoenskroon rural farming community) is aware of the requirements of the NWA (questionnaire).

Objective 4: To identify ways of improving rural farming community awareness of the NWA requirements (questionnaire)

1.4 Structure of the research

This dissertation is structured around six chapters. Table 1.1 shows how the various chapters relate to the research objectives. The logic and outline of the chapter content can be explained as follows:

- Chapter 1 explains and justifies the problem statement as well as the research aim and objectives
- Chapter 2 describes environmental awareness and the links of behavioural responses with the first research objective
- Chapter 3 responds to the second research objective to determine the relevant provisions in the NWA to rural farming
- Chapter 4 explains the research methodology used to address the research aim and objectives
- Chapter 5 explains the data analysis and discusses the findings to research objective 3.
- Chapter 6 concludes on the research and makes recommendations to address the findings as per research objective 4.

Table 1-1 Structure of the research

Research Aim: To determine the awareness of the farming communities with regards to requirements of the NWA.			
Objective	Supporting Literature	Data Collection	Data Analysis
1. To determine what awareness is and the relevant aspects of the subject (Literature review)	Chapter 2	Literature review	Aspects of environment and awareness.
2. To identify relevant provisions of the NWA that has direct relevance to rural farming communities (Literature review)	Chapter 3, 4	Literature Review	Legislative requirements Water Management
3. To determine the extent of awareness of the Viljoenskroon rural farming community w.r.t. the terms of the requirements of the NWA	Chapter 2, 3, 4	Questionnaire Section 3	Questions 5-7 and 9-12 are closed questions. Question 8 is an open question.
4. Identify ways of improving the awareness of rural farming communities in terms of NWA awareness	Chapter 6	Questionnaire Section 5	Recommendations from case studies.

Table 1-1: Integrated data collection to achieve study aim.

CHAPTER 2 ENVIRONMENTAL AWARENESS

The first objective of the research is related to environmental awareness. It is important to understand how individuals, groups and bio-psycho-social divisions behave in response to environmental challenges and how these challenges are perceived (Wong, 2003). Behavioural responses are linked to awareness. How awareness relates to the environment is discussed below.

2.1 What is the Environment?

The Oxford Online English dictionary (2017) defines 'environment' as 'the surroundings or conditions in which a person, animal or plant lives or operates', and 'the natural world, as a whole or a particular geographical area, especially as affected by human activity.'

The environment is defined by different groups or individuals depending on their personal experience and background (bio-psych-social). Individuals within a group may have different understandings and interpretations of their surroundings. Defining an environment is influenced by many systems. There is a wide range of environmental systems, their interactions, and fields of study, which determines the understanding of what an environment is.

Within the National Environmental Management Act of 1998 (NEMA), the environment is defined as the 'the surroundings in which humans exist. These consist of:

(i) the land, water and atmosphere of the earth
(ii) micro-organisms, plant and animal life
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that affects human health and well-being.'

Miller (2005) defines 'environment' as everything that affects a living organism or any unique form of life.

Considering the above definitions, it would appear that there is one consensus, that the ultimate definition and understanding of the environment is anything that interacts, physically, systemically with any form of living organism or form of life.

2.2 What is Awareness?

To understand what awareness is and how it relates to the context of individuals, we must first define it. The root of the word 'awareness' is 'aware'. Being aware is having a knowledge or perception of a situation or fact, according to the Oxford online dictionary (2017).

'Awareness' is defined by the Oxford online dictionary (2017) as 'knowledge or perception of a situation or fact' and 'concern about and well-informed interest in a particular situation or development'. It can therefore be determined that environmental awareness may be defined as an individual's knowledge or perception, and the level of concern and information received about their immediate surroundings. These include both the physical and non-physical aspects that affect their behaviour and development.

The Oxford online dictionary (2017) describes 'knowledge' as 'awareness gained by experience of a fact or situation'. Dictionary.com (2017) defines it as 'awareness or familiarity gained by sight, experience or report.' Therefore, awareness and knowledge are inseparably connected.

Awareness is the knowledge of experience and facts about specific situations and relating facts.

2.3 Defining Environment Awareness?

Considering the definitions of the individual words of Environment and Awareness, Environmental Awareness may be defined as the knowledge or familiarity gained from an individual's surrounding and the interactions of systems within that surrounding. Harju-Autti (2013) defines awareness as a state of being conscious, having knowledge of, and being aware of the external surroundings that influence behaviour and development in which individuals work and live.

Partanen-Hertell *et al.* (1999) defines environmental awareness as a combination of motivation, knowledge and skills. As the model was developed, Partanen-Hertell *et al.* assume that environmental awareness is classified into three areas. These are a combination of skills, knowledge and motivation (figure 2-1) (Kokkinen, 2013).

The elements of environmental awareness have been summarised and categorised by Kokkinen (2013) as follows:

a. Motivation is defined as actions, attributes and aspects that influence :
    - Concern with environmental issues
    - Personal empowerment realisation
    - Understanding responsibility

- Willingness to act

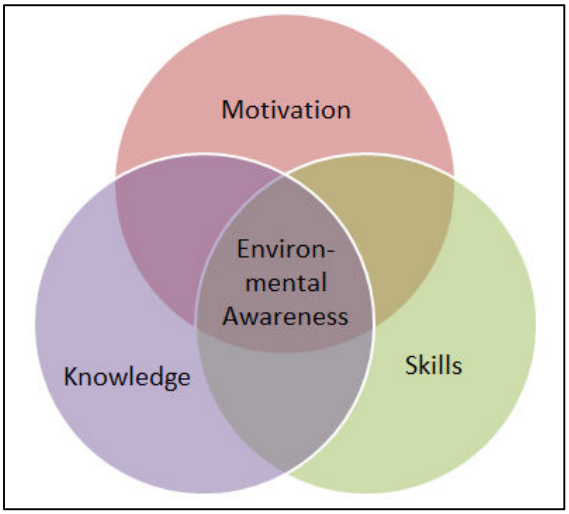


Figure 2-1: Elements of Environmental Awareness Model Adapted model from Partanen-Hertell *et al.* (Kokkinen, 2013)

Largely based on values and attitudes, motivation considers an individual's understanding and concern he or she may have of environmental challenges and responsibilities (Harju-Autti, 2013).

b. Environmental knowledge are the aspects that influence:
    - Environmental issues information
    - Understanding of environmental cause-effect relationships
    - Information on environmentally friendly activities.

The information of the environmental issues and the connection between the cause and effect of these challenges may be made (Harju-Autti, 2013). It is the space in which the most likely response to the issues will be retained, based on the awareness channels that are available to individuals.

c. Skills are determined by and includes ability to act:
    - Different levels: water, waste, education, political activities, legal requirements and organisational activities;
    - Spheres of a person's life: home, work leisure, hobbies; and
    - Identifying deliberate actions vs. habitual actions.

The relationship between skills, knowledge and motivation, are what individuals perceive to be important in the steps towards action and purposeful behavioural responses (Wong, 2003). Partanen-Hertell *et al.* (1999) discuss the different areas of Environmental Awareness to be addressed in the next section.

2.4 What are the areas of Environmental Awareness?

The areas of Environmental Awareness identified by Partanen-Hertell *et al.* (1999) are discussed. It considers each aspect of environmental awareness. This method may be used on individuals and larger groups or entire communities. Each aspect is considered and how it influences or requires environmental awareness to achieve the desired effects. The five (5) areas of environmental awareness is summarised in the table below (table 2-1).

Areas of Environmental Awareness	
a. Policy instruments	State of Environment The Goal to Influence Environmental Policy Instruments Function of Society
b. Awareness Elements	Motivation Skill Knowledge
c. Practice	Awareness and stimulation Desire and opportunity to act Environmentally friendly choices Improved state of the environment
d. Spheres	Private Life Working Life Political Life
e. Stages	1. Limited Environmental Awareness 2. Basic Environmental Awareness 3. Global Environmental Awareness 4. Holistic Environmental Awareness

Table 2-1: Areas of Environmental Awareness Summary (Adapted from Partanen-Hertell *et al*., 1999)

a *Environmental Policy Instruments*

Environmental policy instruments are the requirements set for economic development, regulation and information. These have impacts on the societal, economic, environmental, administrative and other areas which are considered during the strategic level assessment of the requirements of a specific community or country. When the legal and other requirements and policies are created, the dissemination of information is important to ensure that individuals are aware of the requirements, and can act reasonably to ensure that the purpose of the

information is implemented and achieved (Partanen-Hertell *et al.,* 1999. Stern, 2000. Kokkinen, 2013).

The main areas of focus for policy development are the economy, waste discharges and natural resources. This would look at the process cycle that is explained in Figure 2-2. Figure 2-2 illustrates how the environment influences goals, policy and functions. The state of the environment influences individual visions, which in turn create goals of influences, whether it is a producer or a consumer's use of natural resources. Consumers are necessary for economic purposes. Regulation and information is provided for the performance of their various functions in the three (3) different areas of life, i.e. the private, working and political aspects.

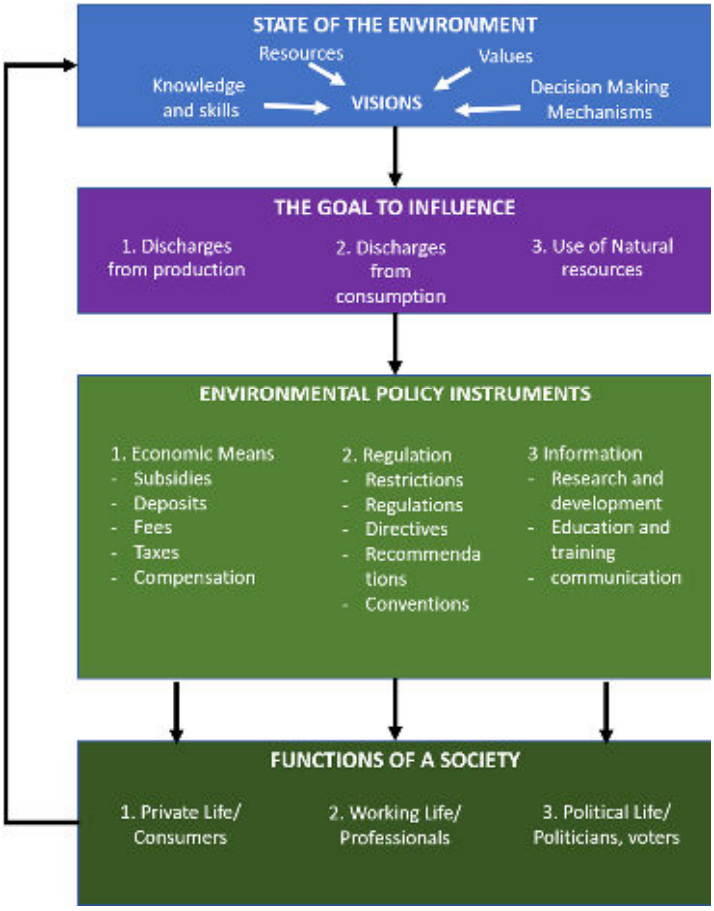


Figure 2-2: Role of Environmental Policy Instruments in Society (Partanen-Hertell *et al.*, 1999)

The policy instruments should act as a guide to influence and determine the level of development of the three (3) awareness elements.

b Awareness Elements

The elements of environmental awareness have been discussed in the section (2.3) above. In order to ensure continuity, the information below serves as a summary of the information discussed above.

Motivation is the ability to create an intrinsic desire to make personal decisions for environmentally valuable choices.
Knowledge is the awareness of environmental issues in order to understand the cause-effect relationship of consumption, production and resource use.
Skill is the ability to act on environmental issues on the basis of deliberate or habitual choices.

Knowledge of these elements is important as it allows individuals to practice environmental awareness. The more the elements are developed, the better the practical implementation for a holistic environmental awareness is possible.

c Practice

This area of awareness is based on the action of individuals. Here the individual will have determined the level at which he or she is affected. This is usually influenced by the sphere affected and then determines the most likely reaction to the situation. Harju-Autti (2013) has illustrated the process in which these actions usually occur (Figure 2-2)

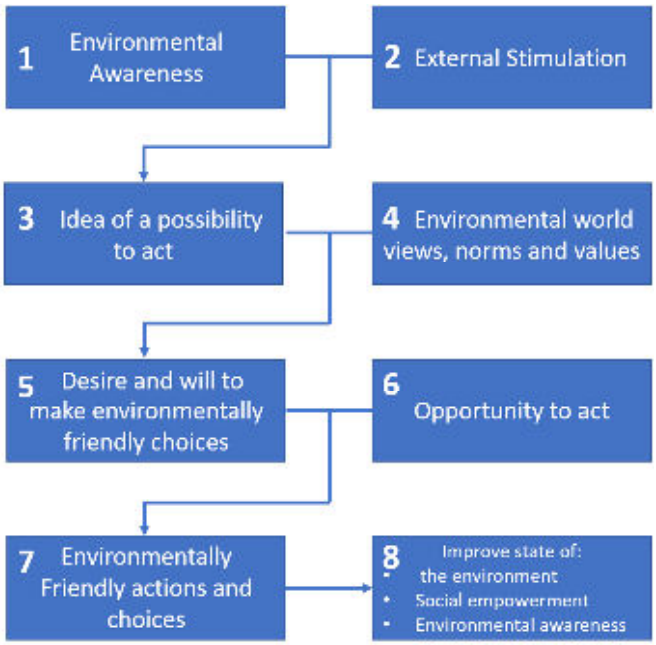


Figure 2-3: Environmental Awareness in practice (Harju-Autti, 2013)

When the environmental elements are instilled in practice within the spheres, the level of environmental awareness will increase.

d Spheres

Within an individual's life, three (3) spheres affect environmental awareness. Figure 2-4 below illustrates that, depending on which sphere an individual is acting in at any given moment, it may influence their degree of environmental friendliness.

For example: Jack does not have the means, industrial support or facilities to recycle at home so he is not concerned with waste separation or recycling. However, at work they have implemented a recycling campaign to ensure that the business waste minimisation programme targets are reached. Jack has begun to learn to separate waste, as well as other initiatives, such as recycling paper. Paper printed on only one side may be used to print other information on the unused side. As the programme progresses, Jack begins to understand the need to minimise waste and starts setting goals in his own home as to what he would like to achieve. As his knowledge grows, he will become more aware of the sustainable values, increase his skills and become more involved in implementing a recycling and waste separation system within his community.

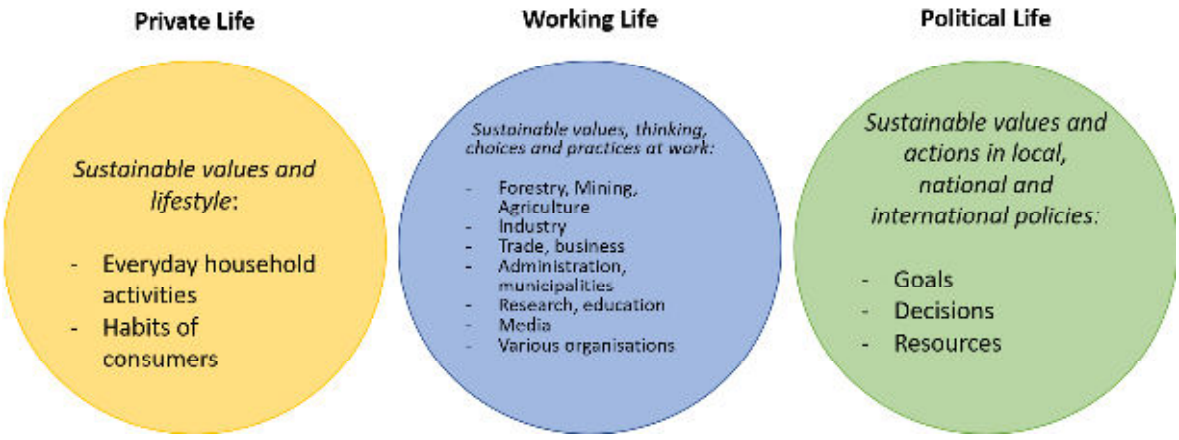


Figure 2-4: Spheres of environmental awareness (Partanen-Hertell *et al.*, 1999. Harju-Autti, 2013)

The level of skills, knowledge and motivation will determine an individual's participation within the different activities. As the level of skill and national support structures increase and improve, the stages of environmental awareness will increase.

e Stages

Environmental awareness has four (4) stages. They range from a community with no level of environmental awareness to where the environmental awareness becomes holistic. Below the Table 2-2 shows the stages and the associated levels of awareness.

Stages of the Environmental Awareness (Partanen-Hertell *et al.*, 1999, Harju-Autti, 2013)

STAGE	DIAGRAM	SUMMARY
Stage 1	Limited Environmental Awareness 	**CURRENT SITUATION** - Motivation to increase knowledge and skills is a growing concern to health - People usually feel someone else is responsible - Environmental matters viewed separately from spheres of life - Information difficult to access which leaves a sense of helplessness - Knowledge is limited and generally environmental issues not publicly known - People lack basic skills **AWARENESS APPROACH** - Generate a need for specific environmental education *STEP 1*: educate and train politicians, administrators, academics and business decision makers. Education makes a difference to regulation and economic development *STEP 2:* enhance motivation by disseminating simple information about the state of the environment *STEP 3*: provide skills to enable an individual to act in an environmentally friendly way.

Stage 2	Basic Environmental Awareness  	**CURRENT SITUATION** - Basic environmental legislation and administrative structures are functional in the society/community - Monitoring foundations created - Environmentally friendly facilities are utilised - Able to separate environmental issues - Environmental responsibilities are now self-motivated - Knowledge becomes broader - Environmental skills growing in personal and business life. **AWAREENESS APPROACH** - Knowledge demand grows quantitatively and qualitatively - Increased technology, research and management - Whole society targeted for environmental initiatives
Stage 3	Global Environmental Awareness  	**CURRENT SITUATION** - Dynamic change and integration between functions of society - Environmental problems are global - Synergy between skills, motivation and knowledge - Information demanded based on changes at local and global levels **AWAREENESS APPROACH** - Acknowledgement and holistic view of environmental responsibility
Stage 4	 Holistic Environmental Awareness	**CURRENT SITUATION** - Awareness is an integral part of all functions of society - Humankind does not own the Environment - Value not based on consumption but on happiness and well-being **AWAREENESS APPROACH** - A holistic environmental approach is taken

Table 2-2: Stages of Environmental Awareness Summary (Adapted from Partanen-Hertell *et al*., 1999. Harju-Autti, 2013)

The four (4) stages above give an indication of how society may grow in skills, knowledge and motivation based on the increase in environmental awareness. In order to get the growth level to ensure that individuals participate in the legal and environmental initiatives, it is important to understand the different methods in which environmental awareness is created.

2.5 How do we create awareness?

Environmental awareness is applicable to all individuals. Individuals all form part of the environment and their actions have consequences and impacts which are both positive and negative. As education, health and incomes increase, individuals acquire more skills, knowledge and motivations, which have a positive impact on environmental awareness.

With the understanding of environmental impact, degradation and protection, new laws, policies and regulations are developed (Wong, 2003). Environmental systems are implemented using the guideline of laws or policies, which create a greater investment in the protection of the environment.

How is this information communicated? There are many channels and types of communication. The topic is very broad and therefore only a summary of the types of communication will be made for the purpose of this paper. Figure 2-5 (Partanen-Hertell *et al*, 1999) has an extensive guide in the form of media, field and communities that can create environmental awareness.

In the figure below, the methods are divided into four (4) main categories:

- *Channels/Forms* – this concerns how the information is disseminated, whether it be electronically, physically, hard copy or by means of excursions
- *Producers/Distributors* – this concerns who shares the information, whether it be through formal educational institutions, government, formal and informal business sectors or individuals who have a passion for environmental information
- *Field* – this concerns the information which is distributed.

Each of these depends of the field of the environmental action or interest.

- *Sphere* – This is the area in which the information is applicable to an individual, business or political institution.

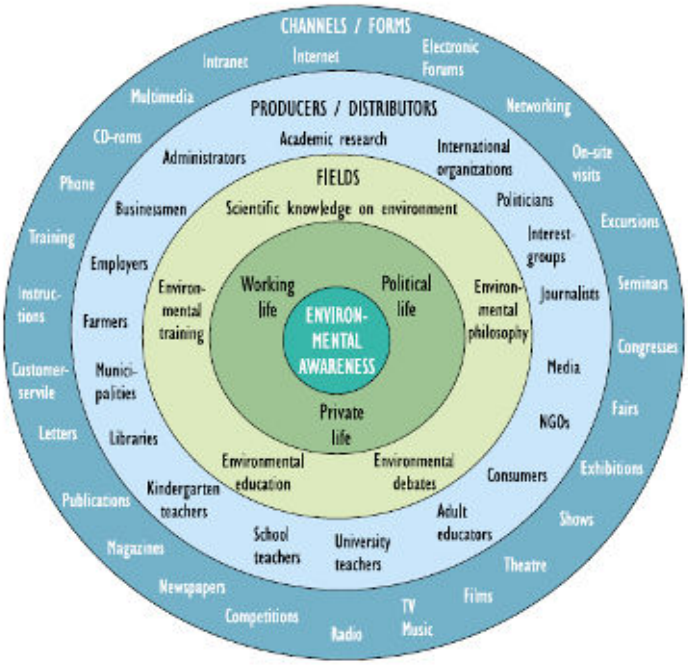


Figure 2-5: How to create an Environmental Awareness Model, adapted model from Partanen-Hertell *et al.* (2006).

Once information has been shared, it is important to determine the value and quality of the information by assessing the awareness level of the population. This will allow organisations to determine the success or failure, and areas that need improvement in terms of information sharing and awareness.

2.6 How do we measure awareness?

Environmental Awareness is, as stated by Harju-Autti (2013), a very abstract concept and measuring it in an absolute manner is not reasonable. The development of environmental awareness measurement was done in the study; 'Raising Environmental Awareness in the Baltic Sea' in 1997 (Partanen-Hertell *et al.*, 1999, Pemberton *et al*., 1999, Harju-Autti, 2013). This is a seminal study as most of the works on environmental awareness follow this study.

In order to determine environmental awareness of the National Water Act in the farming community in the Viljoenskroon district, it is important to understand what the current situation is. Awareness is difficult to measure as there are multiple factors that affect it. Knowledge of what the respondents know and do not know must be determined (Ciochetto & Haley, 1994)

there is a lack of a universally accepted tool when measuring environmental awareness. The methodology is discussed in greater detail in Chapter 5.

In order to determine what the current level of environmental awareness of the National Water Act is in the farming community in the Viljoenskroon Area, Free State, an understanding of what it is, and why it is important in terms of water management is necessary.

CHAPTER 3: NATIONAL WATER ACT AND WATER MANAGEMENT

In South Africa, there are a plethora of environmental associated acts. Each one is ratified, with a specific focus on an area of the environment. The purpose of the legislations is to ensure that the rules and regulations are enforced and that the associated impacts of human activities do not impact the environment negatively (Scholtz *et al.,* 2004; Van Heerden, 2007).

To answer Objective 2, Chapter 3 discusses the relevance of the NWA to farming. In South Africa, the Constitution gives effect to the environmental rights and the Environmental Acts, such as the National Environmental Management Act (No 108 of 1998). These give a framework of the rules and regulations that are to be followed by the citizens and associated activities within the country to achieve the basic environmental rights. The National Water Act (No 36 of 1998) is also a framework law that considers the principles and fundamentals of sustainability and resource protection (Bosman & Kidd, 2009).

3.1 The National Water Act – How was it developed and what is it?

The National Water Act is a legislation that was promulgated in South Africa in 1998. The Act was a transition from the apartheid regime to democracy, in which sustainable water use and access to water for those who previously had no access was ratified (Kidd, 2016). The National Water Act is considered one of the most determined acts internationally, in terms of the environmental management perspective (Bourblanc, 2015). This is due to the commitment to the ecological reserve, which is considered the only water right. The ecological reserve is considered first and is concerned with the 'basic human needs'. In this the basic water needs for every individual, as well as the 'ecological reserve' is considered, while the sustainable long term needs for the associated ecological and aquatic ecosystems is respected. (Bourblanc, 2015).

3.1.1 History of water law in South Africa

The South Africa laws were established on the foundations of Roman law. The development of the law systems was the result of colonisation of South Africa and the different controls of legal systems in those countries that ruled it.

3.1.1.1 Roman Law

During the Roman era, water was classified as either public or private. If the flow of water was large enough to flow throughout the year, in the form of a river or stream, it was a public river. The water that was privately owned was usually water that flowed within a private stream (Singh, 1999). Where there was public water, the water belonged to the state and/or the

community as long as the individual's equal right of use was not infringed (Pinto, 2014). Where the water ran over an individual's property, they were not obligated to consider the downstream users and could use it as they deemed necessary (Pinto, 2014).

3.1.1.2 Roman Dutch Law

The Netherlands absorbed the Roman law into their systems, but because of the large volumes of water available in the Netherlands, much of the Roman law did not apply to them. In 1652, the Dutch occupied the Cape and the settlements there were under Roman-Dutch law (Pinto, 2015).

The laws focused on the navigations and reclamation of land from the water, rather than the acquisition and allocation of land water rights propounded in Roman law (Singh, 1999). The laws were still the same as the Roman law, as all rivers that flowed perennially were considered public water and hence belonged to the whole country; private water was based on individual landowner property rights (Pinto, 2015).

3.1.1.3 Subsequent South African Law

As South Africa went through the various colonisation changes, so its laws were adapted.

3.1.1.3.1 Water Act 40 of 1899

The Cape Parliament enacted the Water Act 40 of 1899. This Act was an important part of the evolution of water laws within the country. The water courts were establishment, and the distribution and allocation of flow was now controlled by the water courts. In this manner, an individual could apply for the water allocations along a public stream and all persons along the water course were allocated water (Singh, 1999).

3.1.1.3.2 Irrigation and Water Conservation Act 8 of 1912

After the union of South Africa in 1910 (Singh, 1999), the Irrigation and Water Conservation Act 8 of 1912 was promulgated. This was ground breaking as it was the first act of water legislation of South Africa (Pinto, 2015). It was primarily used to promote irrigation in South Africa to ensure that the more arid regions had access to water (Singh, 1999).

Public water was considered to be all the water that flowed in a public stream, Where there were riparian property owners on these streams, as per Section 9 of the 1912 Act, they had no rights over the water (Pinto, 2015). The reasonable use of water was permitted. Singh (1999) attributed it to the Common Law of South Africa. As a result two initial principles were formed:

- Reasonable use was determined upon the requirements of individual circumstances and is related to quantity

- Apart from obtained rights, the water use by a riparian owner shall consider the rights of other owners.

The problem with these regulations was that if a new water user wanted water rights for irrigation, all previous users would have to adjust their usage to accommodate the new water user. This led to the water use rights being uncertain and insecure (Pinto 2015).

The private use of water Section 15 to 20(b) was considered to be the water flowing over private land and springs that could be used by the land owner to full enjoyment, as the owner preferred, but was not allowed to infringe on the rights of downstream users (Pinto, 2015).

3.1.1.3.3 Water Act 54 of 1956

The new Water Act has been applied in South Africa since it was passed in 1956. The need for the new act arose after the Second World War, when industrial development increased. The Act was a combination of the Roman-Dutch Law, English law and the conditions specific to the South African environment. Water rights were not contained in the act; only the mechanisms to implement and obtain water rights were stated. Government notices, gazettes and other documentation from the Ministry of Water Affairs and Forestry dealt with specific water schemes, works and areas (Singh, 1999).

Water rights within the Act were not based on who owned the water, but more specifically on individuals who had access to the right to use it and how to use it (Singh, 1999). Pinto (2015) defines water, paraphrased from the act, as:

Public water is any water flowing or found in or derived from the bed of a public stream, whether it is visible or not. This is as no person as per common law, has rights to the water because it is owned by the public.

Private water is water that rises or falls or naturally drains within any land of separate grants that is not capable of common irrigation. It prohibited landowners from removing the water from the property without a permit.

3.1.1.3.4 Constitution of the Republic of South Africa, 1996.

In 1994, with political transformation of South Africa to democracy a new constitution was required which would give everyone free and fair rights within the country (Adams *et al.*, 2015). The Section 24, environmental rights were classified.

Everyone has the right-

(a) To an environment that is not harmful to their health and well-being; and;
(b) To have the environment protected for the benefit of present and future generations, through reasonable and other measures that –
(i) Prevent pollution and ecological degradation;
(ii) Promote conservation; and
(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development

In order to realise these rights, the Promotion of Administration Justice Act (No 3 of 2000) was developed as a comprehensive legislation, as it created the right of administrative justice when dealing with organs of State. It allowed for public participation to be developed to ensure that the relationship between environmental rights and environmental justice is reached sustainably as it supports decision-making. This led to the development of the environmental regulatory framework (King & Reddell, 2015).

3.1.1.3.5 National Environmental Management Act, No 107 of 1998.

The National Environmental Management Act (NEMA) is the underlying framework of environmental legislation in South Africa. NEMA sets out the management principles for guiding the environmental legislations to ensure that there are sufficient directions for the implementing of sustainable development, environmental rights and the protection of the environment. Multiple legal requirements were developed to ensure that there are acts governing different spheres and aspects of the environment (King & Reddell, 2015.Kidd, 2016). This gave rise to the National Water Act, No 36 of 1998.

3.1.2 National Water Act, No 36 of 1998.

South Africa is a water scarce country and as such the legislation has to consider the requirements of the country. South Africa has two main uses of water for irrigation/agricultural and for municipal/domestic needs. The agricultural sector requires 60% and municipal needs 27% (Kidd, 2016). When introducing the act, a phased approach was considered. If the current recognised legal water right were removed, the impact on the economy and effects on agriculture, specifically commercial farming would be too great (Movik, 2014, Kidd, 2016).

The National Water Act (NWA) of South Africa (1998) took cognizance of:

- The scarcity and unevenly distributed water resources and the interdependent cycle of water usage in the system;
- Water as a natural resource which belongs to all people;
- Government's responsibility for and authority over water and its allocation;
- The need for sustainable resource management; and

- The need for integrated water management

The NWA is a means by which the authority implemented water use for all members of South Africa considering the requirements of the above. The guidelines for the implementation and application of the NWA are outlined below:

3.1.2.1 Section 21 water uses

With the NWA, there are 11 water uses that one needs to apply for a general authorisation or a water use licence.

21. For the purposes of this Act, water use includes

(a) taking water from a water resource;
(b) storing water;
(c) impeding or diverting the flow of water in a watercourse;
(d) engaging in a stream flow reduction activity contemplated in section 36;
(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
(g) disposing of waste in a manner which may detrimentally impact on a water resource;
(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
(i) altering the bed, banks, course or characteristics of a watercourse;
(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
(k) using water for recreational purposes.

Within the activities of farming, farmers are subject to Section 21 (a), (b), (c) and (i). These activities require the owner to apply for a licence to ensure that they complky with the regulations of the NWA. For this study we only concentrated on the activities that are applicable to the farmers in the community.

3.1.3 Compliance motivation

When implementing a regulation or environmental legislation, it is important that individuals comply with the requirements. There are, however, different types of individuals: those who comply and those who do not. Some may comply with the rules as they fear violations and punishment, some feel it is their civic responsibility and others comply because of social pressure to do so (Winter & May, 2001).

Below is a table of the influence of compliance and the related motivations based on Winter & May (2001) and the motivation for compliance to environmental regulations. These form part of

the aspects of environmental awareness. Knowledge, motivation and skill all form part of the compliance with environmental legislation requirements.

Summary of compliance influence	
Ability to comply	These are based on the regulated individuals who are aware of what is expected of them to conform to the mandatory steps.
Knowledge of rules	If the regulated users are not aware of the regulations, they will not comply as required by law. If the existence of the regulation is known, it does not necessarily mean that its requirements are understood.
Capacity to comply	Many regulations require the regulated user to obtain new material, equipment, administration and reporting which they cannot comply with as each has associated costs.
Potential complexities	The awareness of rules is not simply a reformer of influence on compliance.
Influential impacts	Social and normative requirements as individuals comply based on the expected compliances, based on what society expects.

Table 3-1: Summary of compliance influence

The impacts of the different motivations of compliance are usually more prevalent in individuals, who are concerned that they may be identified as not complying with the rules, and therefore, more often they are more compliant (May & Winter, 2001).

It is important to acknowledge that the compliance influence is related to the management of resources. In most cases, where areas of the economy and the relevant resources are not management, they may lead constraints on the resource system and sustainability of specific resources.

3.1.4 Water Management

In this section the importance of water on the defined area of the study area is considered. The value of water, water quality and drought are considered. The value of water is that it is an irreplaceable resource; however, due to the current situation of the water courses, the quality of the water is rapidly deteriorating. Many parts of South Africa have been experiencing drought over the past seven (7) years and therefore the management of water is becoming even more crucial.

3.1.4.1 Value of Water

Water is the most important of all the natural resources. All living organisms require water to survive and, therefore, without water the environmental systems as we know them will cease to exist. Water is central to all economic activities and ensures development (Luilo, 2008). The sustainability of water resources is diminishing as the resources are overexploited. Increase in demand and degradation of quality are prevalent concerns.

When governments offer the opportunity for the correct regulation, it may encourage businesses to pursue the shared value of the resource protection. However, should the incorrect implementation be imposed, it may work against the business outputs, and may create trade-offs between the sustainable development goals (Kramer, 2011).

As water becomes scarcer, so the value of it increases. The discrepancies and allocation of water resources will become more critical and authorities need to ensure that authorisations relating to water use is well managed (Nieuwoudt & Backeberg, 2011). Water has an important role to play in the economy. All of industry requires water in one form or the other for production. It creates jobs in terms of agriculture, forestry, mining, and electricity generation (Nieuwoudt *et al., 2004)*. The value of water is important and therefore it is vital to protect it and the quality of its supply.

3.1.4.2 Water Quality

Water quality is related to 'resource quality' in the National Water Act (1998); the act defines it as follows:

(xix) "resource quality" means the quality of all aspects of a water resource including:

- *(a) The quantity, pattern, timing, water level and assurance of instream flow;*
- *(b) The water quality, including the physical, chemical and biological characteristics of the water;*
- *(c) The character and condition of instream and riparian habitat; and*
- *(d) The characteristics, condition and distribution of the aquatic biota.*

As development increases and the need for increased water services rises, there may not be adequate facilities or knowledge with which to deal with the increased demand. This lack may lead to waste and degradation of the quality of water resources (Luilo, 2008). In South Africa, there are many different activities which often have a negative impact on the water quality. For example, mining, industrial activities and a lack of maintenance of the municipal waste and sewerage sites can be mentioned (Luillo, 2008).

Sources of pollution are shown in the table below, as adapted from Luillo (2008) and DEAT (2004):

Sources of pollution and impacts	
Mining and Industry	Heavy metals and other run-off items may be collected in the system. This can change the chemistry of the water which could increase the salinity, pH, metal content and sediment load. This can lead to resources becoming poisonous and detrimental to living organisms.
Urbanisation	As urbanisation increases and the upgrading of waste water management is not maintained or controlled, increased amounts of untreated waste water enter the water system. High organic nutrient loads enter the water system and encourage fungal blooms as well as microbial contamination.
Agriculture	All activities relating to farming such as feedlot run-off, agro-chemicals (pesticides, herbicides and fertilisers) and other chemical can end up in the water system, negatively impacting the environment.

Table 3-2: Sources of pollution and impacts

The world population keeps growing with a concomitant, unsustainable overexploitation of natural resources, with a negative impact on water resources. Deterioration of the water quality reduces its fitness for use (DEAT, 2004). As the need and demand for water increases and the quality decreases, the demand on all resources increases. This may be aggravated by climate change as the environment becomes more unpredictable. Below we will discuss one cause of water strains, and this is based on the drought that the major part of South Africa has experienced to different extents over the past years.

3.1.4.3 Drought

South Africa is a semi-arid country and the spread of rainfall is erratic, therefore the strain on water resources is high. This is aggravated when the country experiences drought. Many sectors of the economy rely on water for food and other consumer related products. During droughts, the decrease in water availability will impact industries and economic sectors that are

reliant on water. Turton (2016) explains that the droughts which affect South Africa are as follows:

1- El-Niño drought disaster: Pressure system in the Pacific affects the weather globally reducing the amount of rainfall that South Africa receives.
2- Climate change: Due to increased emissions of greenhouse gases and the overexploitation of natural resources, there has been an increasing trend of surface temperatures.
3- Transition of extractive economy: The removal of elements from the earth through mining led to the extraction of water. As the mines become less economic they are closed down. This, however, has led to the increase in acid mine drainage and thus polluting the water.

The drought has left many individuals and economies without water. In the local subsistence farming community, crop failures and loss of livestock have increased the strain on already impoverished communities. On a larger scale the effects have been loss of employment, closing down of businesses and in some instance lives were lost, because individuals who were unable to manage the stress of the drought on their farming businesses took their own lives.

The requirement for legislation and regulation is important to ensure the protection of the environment, economies and social development. The principles of sustainable development are therefore the pillars of our legal framework. It is important to consider the value of the legislation and its impact on users. Often the legislation may be the best in the world, the awareness of the legislation may be present but the capacity for implementing the legislation may be lacking. It is therefore necessary to investigate what the level of awareness of the NWA and its requirements are within the rural farming community of Viljoenskroon in the Free State.

CHAPTER 4 METHODOLOGY

The methodology used for research is replicable in other research. This is as Han & Kohara, (2015) indicates that the reliability of research is in the basis of validity. Below the methodology of the research is explained.

4.1 Research Strategy

The research strategy was designed in order to deliver the research aim and related objectives. Therefore, the outcome answers the objective and the aim. In order to do this, the approach should consider the sample and the best method for receiving responses.

The research method chosen was the qualitative method. Griffith (2013) explains that qualitative data collection is the method of collecting data based on event, incidents and experiences (Sandelowski, 1995). When defining awareness and knowledge, the foregoing method describes the aim of our research, i.e. to determine awareness. The method of investigating the response was done in a structured interview. (A detailed design is described in Section 4.3). The participants would explain their situations as they went through the questionnaire. As there are many frustrations in the rural farming sector, it was decided that the questions be set in order to ensure that the critical information for the aim was covered.

The Viljoenskroon community was selected as the author is a resident and member of the community. This assisted in access to participants. The sample size was based on the number of members involved in farming in the area. Griffith (2013) shares the information of Lincoln & Guba (1985) that, like quantitative adaptive probability sampling techniques, qualitative sampling may have changes in the sample size as the study progresses. This is as the emerging data collection may be affected by the resulting research questions and answers (Griffith, 2013). As the question already limits the group of study and the area based on a geographic location, the number of participants will be limited. (Further reference to this is made in Section 4.5.).

In the remainder of this section, more detail is offered on the methodology of this paper.

Research Design Summary	
Research Method	Qualitative
Study Design and Strategy	Structured questionnaire to the farming community in the Viljoenskroon Area
Purpose	Assess farming community awareness of NWA
Method	f. Identification of study area g. Design questionnaire based on literature review h. Validity and reliability testing i. Uniform sampling selection j. Define data collection strategy
Analysis	k. Inductive approach l. Discourse analysis method m. Descriptive statistical approach
Outcome	To determine the level of awareness of the National Water Act of the farming community.

Table 4-1: Research Design Summary

4.2 Study Area

The study area that has been chosen for this paper is the Viljoenskroon rural farming community in the Moquaka Municipality, Free State Province. The boundaries are the same as set out in the municipal boundaries. (Figure 4-1 shows a map of the area, the white lines indicate the municipal boundaries). Most of the individuals in the rural farming community live in the area, are part of the farming activities and rely on it for their income. The study area is approximately 35000 ha (Local Government, 2017) and the community has the Vaal River and the Rhenoster River within their boundaries. It is predominantly an agricultural community with mainly dryland farming and livestock grazing.

The farms which border the rivers have irrigation systems in place and therefore would require water for the crops that they are producing. The farming community are comprised of:

- Large farming corporations
- Small farming corporations
- Large Individual farmers
- Small Individual farmers

The farming activities that occur in the area are dry land planting, irrigated land planting and livestock farming. The types of crops that are planted are as follows:

- Maize
- Sorghum
- Sunflowers
- Soy
- Wheat
- Beans
- Ground nuts

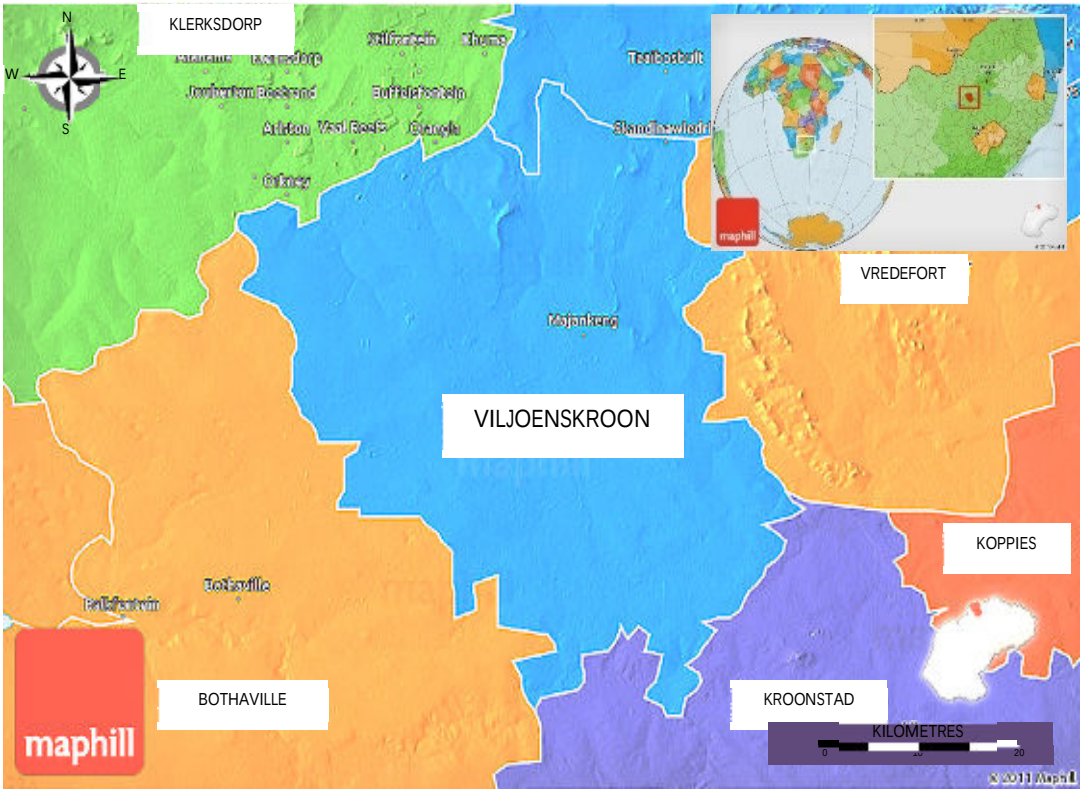


Figure 4-1: Map showing area of study, Viljoenskroon, Free State. (Maphill, 2017)

4.3 Survey Design

The information in the literature review influenced the survey design in order to reach the research aim. Table 4-2 provides a summary of the questionnaire; however, a full version of the questionnaire can be found in the Annexure 1 – Questionnaire. As Ritchie & Lewis (2003) explain, the questions are designed to be explicit and clear; focused; able of being researched by data collection; associated with existing research; and feasible.

The questionnaire consists of five (5) sections, as follows:

Section 1: Demographic information
Section 2: Activity baselines
Section 3: National Water Act awareness
Section 4: Awareness of Impact of farming on the environment
Section 5: Current water challenges for farmers

In Section 1, questions determined the farming community's basic knowledge of water-related issues. The privacy of participants' personal details was guaranteed. This ensured that they would not be targeted for legal non-compliance.

Section 2 deals with the baseline information. This determines the types of activity of the farmer. The regulation states that people who abstract water require a specific license for it, hence the questions pertaining to whether these participants were aware of these legal requirements. The type of farming determines which season(s) they will need water

The National Water Act questions are covered under Section 3. Farmers receive information at workshops presented by the Department of Water and Sanitation (DWS) as well as when they personally apply for licences. The objective closed question method was used in this section in which participants have to simply answer yes or no. One open ended question (question 8) determines the understanding of a water course (Timmermans & Cleeremans, 2015), as it allows participants to reflect on their interpretation of the specific question (Lee & Park, 2016).

Section 4 and 5 uses the closed questions on the Likert scale model. Capuano *et al.* (2016) describe the Likert scale as one which determines the participants' degree of agreement or disagreement with a statement or question.

The design of the questionnaire was done taking into consideration the requirements of the research objectives.

4.4 Validity and Reliability Testing

In data collection, it is important to ensure that the data are reliable and valid. The method of collection should be valid and this is tested by ensuring the questions can be replicated in and reproduced in other research questionnaires (Han & Kohara, 2015).

There are some limitations to an assessment of awareness. In terms of questions and the Likert scale used for some of the questions, there may be certain variances in answers. As Harju-Autti (2013) explains, there are challenges in environmental awareness surveys and within the assessment the irregularities may be due to:

1) Individuals interpret scales differently;
2) The answers could be what the participant thinks the researcher may want to hear;
3) People may be culturally driven to avoid extremes or only select extremes;
4) People may answer in ways that do not reflect reality due to fear of possible consequence of answers.

These issues were managed as per guides by Gill *et al.* (2008) in the design of the questions as follows:

1) Scales were defined in the questionnaire;
2) The researcher explained each question individually to participants to encourage them to give an answer that was most applicable to their current situation;
3) The extremes were an option for participants if could relate to given a situation;
4) The questionnaires were done anonymously; therefore the fear of possible consequences was at least partly removed.

The reliability of the study could be justified as the questionnaire is not specific, but because of the topic (National Water Act and Environmental Awareness) within an economic sector (farming), it may be used again to test responses in different areas. The initial questionnaires were shorter than the final one used. However, based on the responses of the first few participants, it was decided to include the additional information as the participants mostly gave similar information without being asked.

4.5 Data Collection

The method of collection was by means of contacting farmers and farming related services to set up meetings. During the meeting an interview was conducted session while the respondent completed the questionnaire. More than 70 members of the farming community were contacted, but only 21 responded. The people contacted were either —

- not willing to comment;
- unreachable; or
- afraid of answering questions because of legal implications.

As a result, the sampling population has a homogenous nature. However, as the area of study had been preselected, we could not expand to participants outside the study area. As Wilmot (2005) asserts, in qualitative data collection the number of participants is often low. Nonetheless, the purpose of the research technique employed is not to produce a statistical representation of the whole community, but rather aims for depth and breadth.

When the 21 interviews in the survey had been conducted, the questionnaire was translated to Afrikaans by the interviewer to accommodate the individuals who did not understand English. The duration of the interviews was between 20 and 30 minutes, depending on the individual. The farmers would often go into broader topics after the pilot questions. It was decided that additional questions be included, as the farmers would provide the answers without prompting.

The data collection methodology is important, which, if not done correctly, the interpretation of the data may subsequently be questioned. The results and the discussion of the data are presented in the next section. The complete data set is attached in the Annexure 2.

CHAPTER 5 RESEARCH RESULTS AND DISCUSSION

The total number of questionnaires distributed was 70, of which 21 were received back. The data was captured manually into Microsoft Excel for analysis.

The aim of the study is to answer the following questions:

1. To determine what awareness is and the relevant aspects of the subject (Literature review);
2. To identify the provisions of the NWA which have direct relevance to rural farming communities (Literature review);
3. To determine the extent of awareness of the Viljoenskroon rural farming community with regard to the requirements of the NWA;
4. To identify ways of improving the awareness of rural farming communities in terms of NWA regulations.

The section below highlights the data gathered and the discussion.

5.1 Overview of Data

From the responses received, the raw data was summarised and allocated to respective categories in the table (Table 5-1). The participants' responses were categorised into the relevant groups of information. All of the questions (24) were captured, but due to deficiencies of some responses, it was decided to remove some of the information as it may lead to irrelevant information within the result.

The questionnaire consisted of five (5) sections, and they are as follows:

Section 1: Demographic information
Section 2: Activity baselines
Section 3: National Water Act awareness
Section 4: Awareness of Impact of farming on the environment
Section 5: Water Challenges of farmers currently

The response deficiencies were mainly due to respondents needing to return to their business or felt that the information was not relevant to them. This is specifically for questions 13 – 19. The information for questions 3 and 5 is excluded on the request from the majority of the participants to ensure privacy and anonymity. The research results below and the data discussion will be done per section.

5.1.1 Section 1 – Demographic information

During the assessment the following personal information of the participants was taken into account:

- Age
- Years involved in farming
- Size of farms (ha)

5.1.1.1 Question 1 – Participant Age

The age of the participants within the study ranged between 22 years and 64, with an . average age of 42. The graph below (Figure 6-1) demonstrates the age distribution.

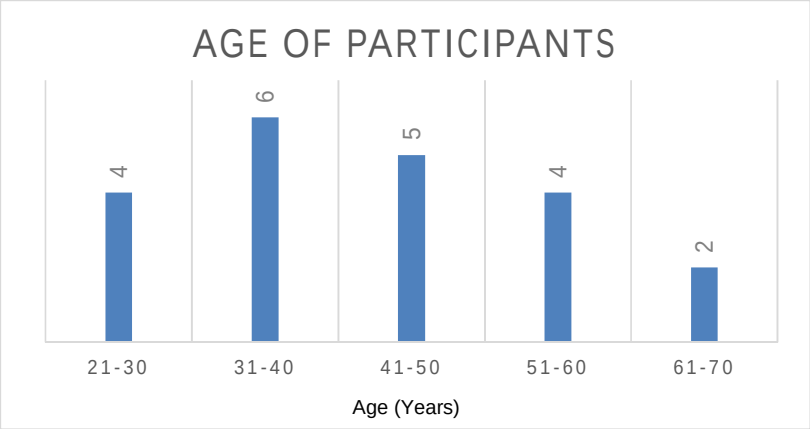


Figure 5-1: Age of participants

5.1.1.2 Question 2 – Participant Experience (Years)

This question is included as it was considered important to establish whether there is be a correlation between age and awareness of the National Water Act. The least number of years of experience was 2 and the highest 40, the average experience being 17 years. The graph below (Figure 5-2) illustrates the information. The following gives a breakdown in percentages:

1-10 years: 43%
11-20 years: 24%
21-30 years: 19%
31-40 years: 14%

The preponderance of participants with farming experience between 1-10 years (43%), and the gradual decrease thereafter, may indicate that younger farmers are gradually becoming more involved in farming, which indicates sustainable continuity in age of the farming community.

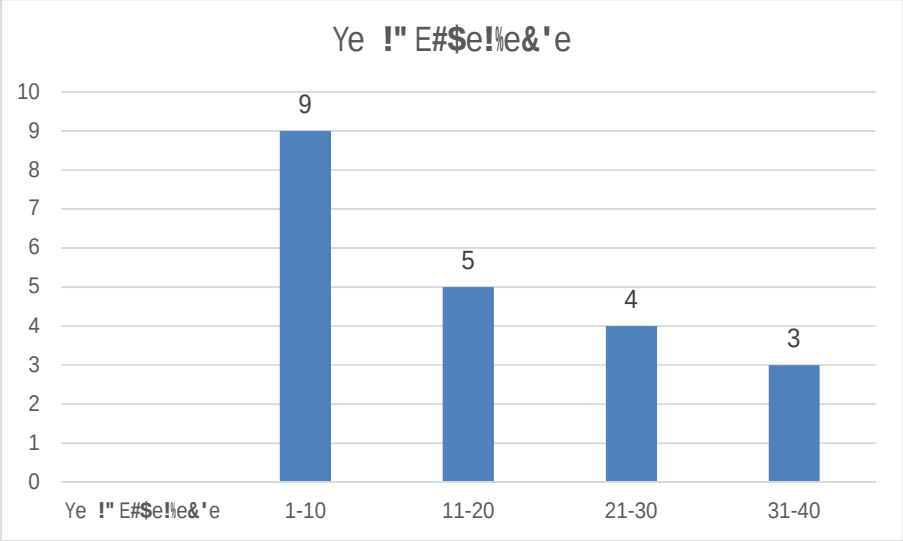


Figure 5-2: Years of experience of farmers.

5.1.1.3 Question 4 – Size of farming activities

The total area included in this study was 23 627 ha. The farm sizes within the study area are summarised in Table 5-1. 43% of the respondents have relatively small operations (43%), while four (4) of them farm on is 48% of the total area.

Size (ha)	Number of farms in category	Total farms (%)	Total Land of participants (%)
0-500	9	43	11
501-1000	4	19	15
1001-1500	2	10	10
1501-2000	2	10	16
Over 2001	4	19	48

Table 5-1: Farm sizes (ha)

5.1.2 Section 2 – Activity baselines

The types of activities on the farms were determined. This information created a baseline to assess what farming activity the participant engaged in and whether there was a water source on the property.

5.1.2.1 Question 1 – Types of farming activities

The types of activities on the farms were determined. This information may be used to determine the types of water uses required for the activity. Two types of farming were identified; livestock and agricultural cropping. The average number of animals per respondent was 172 of cattle and 124 of sheep. It must be noted that not all of the farmers have livestock. These are the averages of the study.

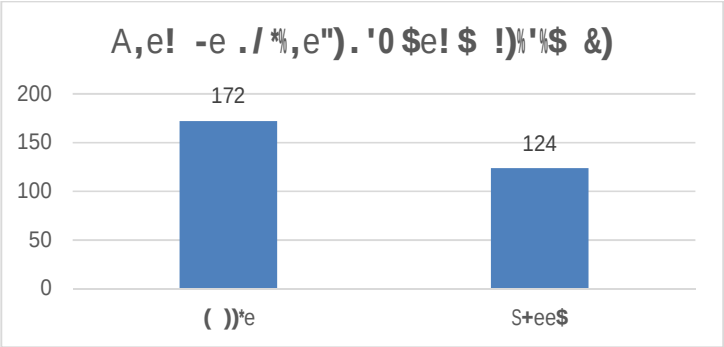


Figure 5-3: Average livestock per participant

The types of crops planted can be seen in Figure 5.4. Maize (at 57%) predominates, followed by sunflowers (17%). 5% is used for grazing, 6% for cultivation of wheat and 3% soy. Finally there are a few farmers who planted beans (1.5%), sorghum (1%) and cover crops (0.25%) to prevent erosion during the winter and spring months.

Under irrigation only, the crop rations are 50% maize (summer months) and 50% wheat (winter months).

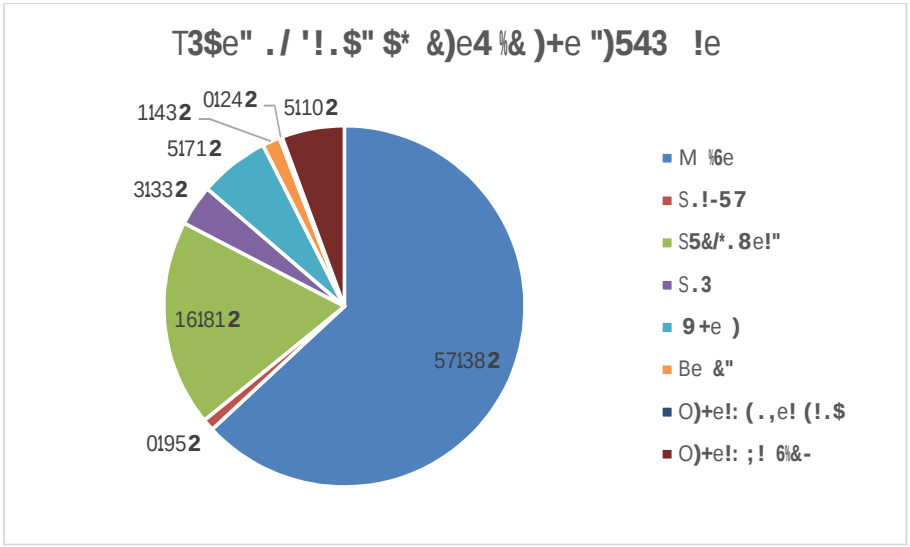


Figure 5-4: Types of crops planted

5.1.2.2 Question 2 – Types of farming percentage dryland to irrigation

The types of activities on the farms were determined. This information may be used to determine the types of water uses required for the activities in the area. Based on the data collected, only 10% of the farmers have irrigation which requires a water use licence for abstraction.

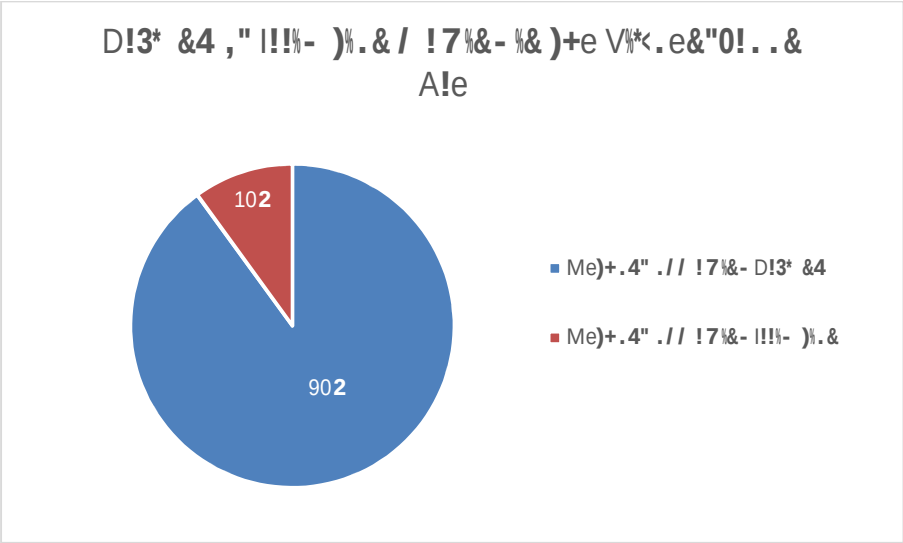


Figure 5-5: Dryland vs Irrigation Farming

As some of the respondents had both dryland and irrigation farming, the ratios are relevant. 50% of the participants have dryland only farming, while a mere 5% depended solely on irrigation.

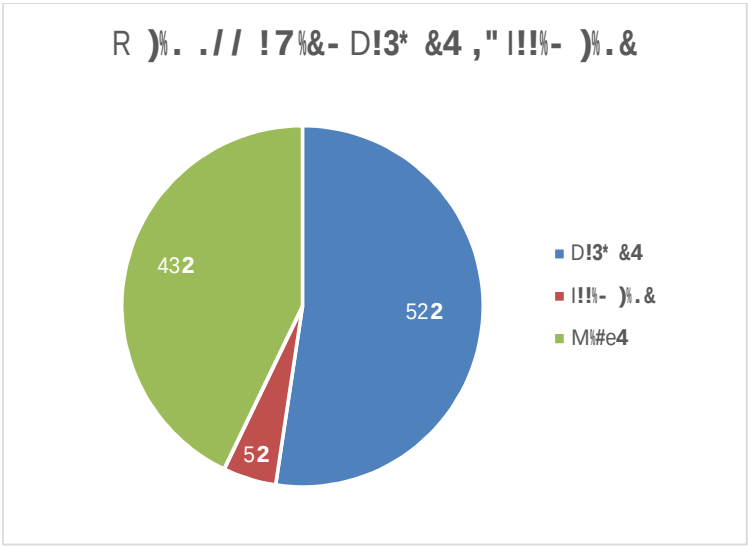


Figure 5-6: Dryland vs Irrigation Farming

5.1.2.3 Question 3 – Do you have any of the following water sources on your farm?

The type of water sources available to the participants was determined. Most farmers (76%) had a borehole on their farm; almost half of farmers (43%) had dams on their farms; and just more than a quarter (25%) of the farmers had a river on their farm (Vaal and Rhenoster).

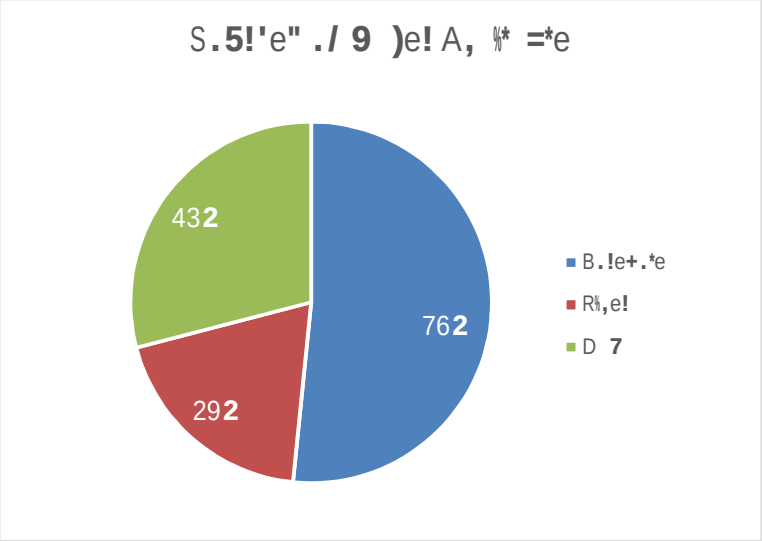


Figure 5-7: Sources of water available to farmers.

5.1.2.4 Question 4 – What is your main source of water?

This is important to establish, as it determines the type of water use for the participants. From a resource quality and quantity perspective; the source determines what the participants' needs are. The majority of farmers have drylands and most use boreholes, mainly for their daily requirements (Schedule 1 Water Use). The farmers who practise irrigation, use either dams or rivers.

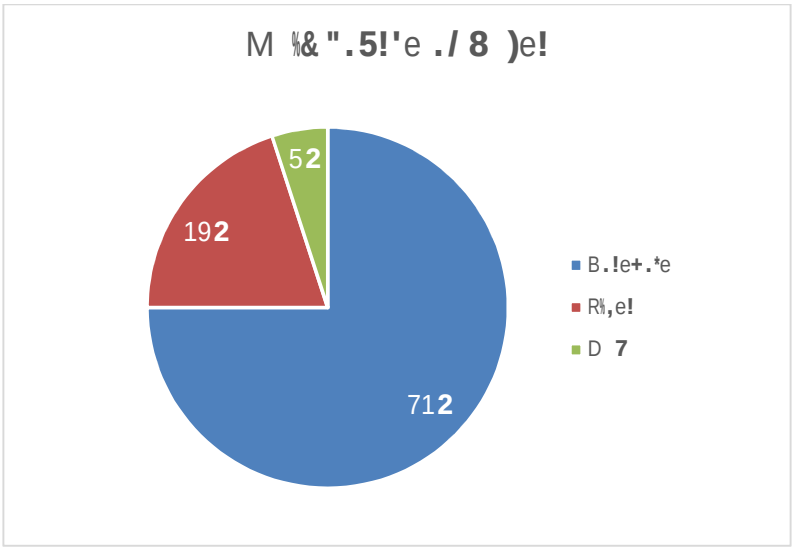


Figure 5-8: Main source of water used.

5.1.3 Section 3 – National Water Act

This section was used to determine the awareness of the National Water Act and the Section 21 stipulations on water uses:

5.1.3.1 Question 5 – Have you received any awareness training or seminar for NWA from DWS?

This question quantifies the involvement of the Department of Water and Sanitation (DWS) within the community. There are many platforms from which to provide information sessions. Often, when the regulation requirements change, the Department may choose to have sessions with communities, through agricultural forums, festival information stands or simply going from farm to farm to check the current licenses and advise individuals on what the new requirements will be. However, the data shows that no such information sessions have been conducted.

5.1.3.2 Question 6 – Have you received any awareness training or seminar for NWA from a formal institution?

Some of the individuals within the farming community often attend seminars and training with regards to the activities on their farms. It was necessary to identify if any of the participants had received formal training or awareness from higher education institutions. Only two individuals received training from a formal institution and it was a sub-topic within a different course.

5.1.3.3 Question 7 – Do you know the definition of a 'water course' as defined by NWA?

A watercourse is defined by the National Water Act (1998) as:

(a) a river or spring
(b) a natural channel in which water flows regularly or intermittently
(c) a wetland, lake or dam into which, or from which, water flows
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Of the participants only 38% agreed that they knew what the definition was. This however changed when asked to define a water course.

5.1.3.4 Question 8 – What do you define a water course as?

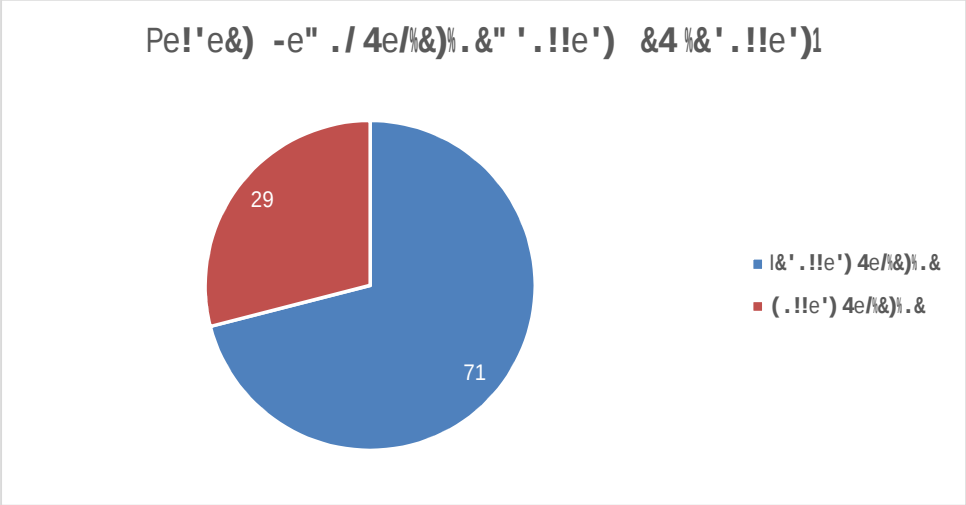
We classified the answers into four groups. The answers were provided in sentence form and only the defined words were used to categorise the definitions. The groups are as follows:

Category	Definition	Number of participants answered	Overall Percentage
1	A River	7	33%
2	Natural flow of water	8	38%
3	Only a River and Wetland	1	5%
4	River, wetland and ground water	5	24%

Table 5-2: Water definition categories as answered by participants (NWA Definition is category 3)

Considering the above responses, and using the definition of the National Water Act, we can surmise that category 3 is correct. Only 5% of the participant knew the actual definition of a watercourse. Category 4 is partially correct, as groundwater is not covered within the Act. However, a holistic definition may ensure that environmental awareness will ensure protection of this resource as well. Category 4 had a response of 24%, while 29% of the participants knew what the definition is cand 38% of participant who responded in question 6 that they knew what the definition is.

Categories 1 and 2 were not completely incorrect in that they made no reference to wetlands.



Below we can see what the total understanding of the definitions was.

Figure 5-9: Percentages of definitions given correctly.

5.1.3.5 Question 9 – Have you heard of the National Water Act before?

The majority of respondents have heard of the National Water Act. Three participants (14%) had not heard of it before, but two of these practise 100% dryland farming; the third one (who is 28

years old with 3 years' experience in farming) has only 5% of the farm under irrigation. ~~could summarise this as the majority of dryland and irrigation farming participants have not heard of the NWA, which is concerning as there are irrigation farmers.~~ It is evident that dryland farmers do not concern themselves with the Act, nor do they need to do so.

5.1.3.6 Question 10 – Have you ever applied for a water use licence?

38% of the participants have applied for a water use licence. It should be noted that not many of the applicants have do so themselves, but used consultants for the purpose. This percentage is similar to that of the definition of a water course.

It is noted that while many respondents who make use of irrigation, have applied for licences, but some who are operating without licences. The individuals who manage these farms are not aware of the licence requirements, but the organisations for which they work may have them and they may be within limits specified in the Act.

Based on the information received, the figures below (6-10 & 6-11) show the discrepancies. Of the participants who are 100% dryland only one has a licence. The 100% irrigation participant has a license whilst some of the mixed farmers (14%) have no water licence for their operations. There are three farmers (33% of mixed farmers) who are doing irrigation without licences.

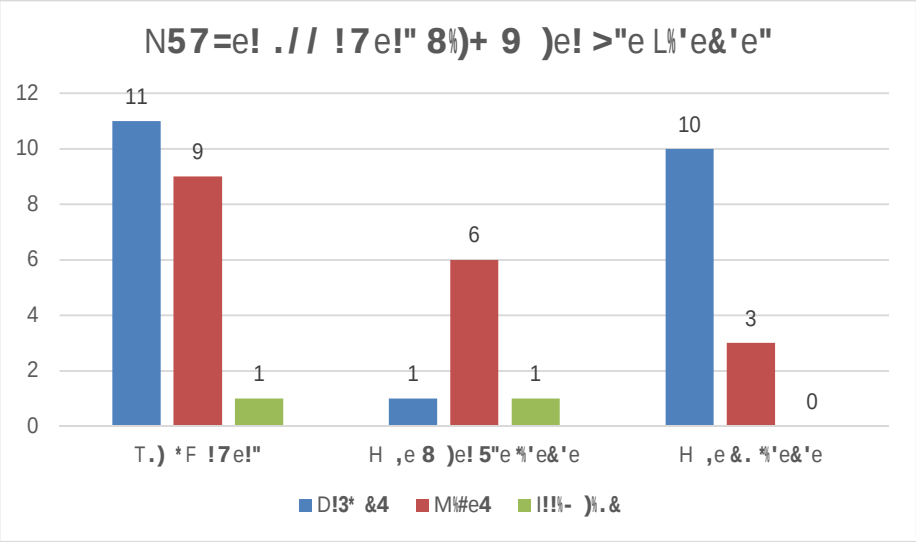


Figure 5-10: Number of farmers with water use licences.

5.1.3.7 Question 11 – Do you know the requirements of a water licence application?

Only 33% of the farmers were aware of the requirements of the application process. Many of the participants do not personally apply for the applications and usually have a consultant apply on their behalf.

Many of the participants noted that they would like to understand the process in order to assess the consultant's role in the application process. They usually just have to do what the consultants ask as they are not aware of the processes.

5.1.3.8 Question 12 – Do you know when you require a water use licence?

This section of the questionnaire is to determine if the farmers knew about the different water licencing requirements based on Section 21 Water Uses. They were listed as follows:

(a) take water from a water resource;

(b) storing water;

(c) impede or divert the flow of water; and

(i) altering the bed, banks, course or characteristic of a watercourse.

The responses were inconsistent with the other answers in the questionnaire. Forty eight percent (48%) of the participants knew they needed licences for these activities and 52 did not.

The inconsistencies are that:

- 14% have heard of NWA;
- 33% knew they required WULA;
- 38% have applied for a licence before; and
- 10% have received some form of training.

However, almost fifty percent (50%) of participants knew that they had to have a licence for the four water uses listed in the questionnaire. According to Winter & May (2001), this could be related to the knowledge of rule as the participants may have been aware of the regulations, but did not know of the process to comply with such regulation.

All of the questions with regards to the National Water Act gave a sense of awareness. The knowledge of the specific requirements was investigated and it was found that the farming community within the Viljoenskroon area were not fully aware of the National Water Act requirements, as the majority of the farmers are not ignorant of the Act, but do not know all its details. Many of the participants noted that they would like to have sessions where the information, even if it is basic, can be shared with them. These sessions may be done as follows:

On-site visits from departmental officials: This is not intended to punish the farmers, but rather to make them aware of the legal requirements and provide them with an opportunity to rectify any non-compliance.

Exhibitions (such as NAMPO): During the May month exhibition, it is estimated that approximately 80% of the local farming community attend the NAMPO Harvest Day Exhibitions. This is an opportunity to disseminate information.

Magazines (Farmer Weekly or Landbou Weekblad): These are examples of the magazines the farmers in the area are reading. If a segment of the NWA Section 21 water uses, specifically for farming, is included, the awareness levels will be raised, allowing farming communities to comply with the legal requirements.

Training and seminars: Local farming institutions and agricultural support systems may be used as a platform to share messages with the local farming communities.

Table 5-3: Results Table from questionnaires

Questionnaire \ Form Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Age (years)		45	30	33	56	45	52	32	39	49	30	54	64	45	31	28	62	22	55	47	33	32
Size of activities (ha)		900	400	2300	2800	950	1700	500	1200	300	0	977	0	3700	2000	500	500	750	1200	2500	0	450
Involvement in farming (years)		21	9	15	32	15	20	8	19	10	7	25	39	18	5	3	40	2	30	27	8	5
Main activities	Livestock	400	200	0	580	100	200	150	0	0	0	250	0	1400	1000	500	200	400	440	400	0	0
	Maize	50%	50%	80%	70%	80%	80%	90%	100%	100%	0%	90%	0%	50%	65%	40%	40%	50%	50%	60%	0%	60%
	Sorghum	10%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Sunflowers	0%	0%	0%	20%	10%	10%	5%	0%	0%	0%	5%	0%	15%	28%	50%	50%	50%	50%	40%	0%	20%
	Soy	0%	0%	0%	5%	0%	0%	5%	0%	0%	0%	5%	0%	35%	0%	0%	10%	0%	0%	0%	0%	10%
	Wheat	40%	50%	10%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%
	Beans	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	0%	0%	0%	0%	0%
	Other: Cover Crop	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other: Grazing	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%
Percentage of Dryland:Irrigation		70:30	0:100	80:20	100:0	95:5	100:0	100:0	100:0	100:0	80:20	95:5	95:5	100:0	100:0	95:5	95:5	100:0	100:0	100:0	80:20	100:0
Do you have the following on the farm	Borehole	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
	River	Yes	Yes	Yes	No	Yes	No	No	No	No	No	Yes	No	No	No	No	No	No	Yes	No	No	No
	Dam	No	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No	No
What is the main source of water	Borehole	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	River	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No
	Dam	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No
Have you received awareness/training from DWS		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Have you attended awareness/training from an institution		No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
Do you know what the water course definition is as per NWA		Yes	Yes	No	Yes	Yes	No	No	No	No	Yes	No	No	No	No	No	No	Yes	No	Yes	Yes	No
Have you heard of the NWA		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Questionnaire \ Form Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Have you ever applied or a water use licence - which activity	Yes Irrigation	Yes Irrigation	Yes Irrigation	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes	No	No	No
Do you know the WUL requirements	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	no	Yes	No	No	No	No	No	No	No	No	No	No
Do you know you require a licence under S21 (a),(b), (c) & (d)	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
What is your definition of a water course	2	3	1	2	4	1	2	1	1	4	2	2	1	4	1	4	2	2	4	2	1

The generalised definition of a water course:

1	A River
2	Natural flow of water
3	Only a River and Wetland
4	River, wetland and groundwater

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

This chapter presents the conclusions of the research, based on the outcome of the data analysis; it is structured with reference to the different research objectives.

6.1 Objective 1: Environmental Awareness

The definition of environmental awareness and the individuals' unique responses to their knowledge and experience will influence their level of environmental awareness. In designing programmes and campaigns for a community where environmental information is to be shared, knowledge of the level of awareness of that community is paramount for the success of the programme and/or campaign. The aspects of awareness as elicited from the literature are as follows (Table 6-1):

Environmental Awareness Aspects	**Summary**
What is the environment?	The environment is anything that interacts, physically, systemically with any form of living organism or form of life.
What is awareness?	The knowledge of experience and facts about specific situations and the related facts
What is environmental awareness?	*a. Policy Instruments*: Economy, discharges and natural resources *b. Elements*: Motivation, Knowledge and Skill *c. Practice*: Actions *d. Spheres*: Influences on individuals' private, work and political lives *e. Stages*: Understanding the level of awareness based on holistic integration of the above policy instruments, elements, practice and spheres.
Methods of creating awareness	- *Channels/Forms* – this is based on how the information is disseminated. - *Producers/Distributors* – These share the information. - *Field* – This is the particular information which is distributed. - *Sphere* – This is the area in which the information is applicable to an individual, business or political institution.
How to measure awareness?	Determine the current level of knowledge on the subject that requires investigation.

Table 6-1: Results summary from literature review

The information above summarises what, with available literature, environmental awareness is, how to disseminate information, and the current best practices in testing what the levels of environmental awareness are.

6.2 Objective 2: National Water Act and Water Management

The National Water Act was the most ambitious water law when it was promulgated (Bourblanc, 2015) in that it considers the ecological needs and the basic individual water requirements. With the historical development of South African Law and the challenges that face the country with water shortages due to decreasing water quality and drought, the law simply outlines the requirements for licences.

The licencing activities are the method by which the government attempts to protect the water resources; however, compliance with the law is another matter. There are many methods of compliance and reinforcement strategies; however, if individuals are not aware of the law and the requirements of it, they may not be able to comply.

Therefore, in order to understand what the levels of awareness are, this study looked at the Viljoenskroon community to determine the level of awareness with regards to the NWA requirements regarding farming activities relating to

- Schedule 1: Permissible water use for personal use
- Existing Lawful Use: previously authorised
- General Authorisation: Activities that need to be registered
- Licensing (Section 21 water uses)

The analysed information was that there is a sense of awareness however, the level of awareness is poor and without consulting specialists, the farming community will not always comply correctly.

6.3 Objective 3: Extent of Awareness

Based on the research results and discussion, it is clear that the awareness of the National Water Act (No.36 of 1998) is not optimal in the community. The purpose of the legislation is to ensure that the rules and regulations are enforced by government (Van Heerden, 2007) for the protection of our natural resource and water management. The farmers are generally aware of the National Water Act (86%); however, the requirements and the process relating to the Act are unknown.

The data collected indicates that there are participants who have irrigation farming but may not have the relevant licences to be operating the facilities. With the constraints on the resource at present, the control and management should be more effective. The participants, who were

aware of the Act, often use consultants for licence applications as they wanted to ensure compliance but without 50% of the respondents have no knowledge of all the details.

6.4 Objective 4: Methods of improving Awareness

From the results and discussion, it is suggested that the following methods for improving awareness be implemented within the Viljoenskroon farming community. An environmental awareness campaign should be launched in the area to make farmers aware of:

- The National Water Act and the Section 21 requirements;
- Environmental impacts of water resources and the necessary constraints; and
- Why the Act strives to protect water resources with the Section 21 requirements.

Considering the various channels and forms for communicating information, specifically to the farming community, it is suggested that the following be used:

- On-site visits
- Exhibitions (such as NAMPO)
- Magazines (Farmer Weekly or Landbou Weekblad)
- Training
- Seminars

The producers/distributors should be knowledgeable representatives from the Department of Water and Sanitation. This will ensure that the correct information, as part of environmental training and education (Partanen-Hertell *et al.,* 1999), is imparted to the farming community. This should ensure that the farmers are properly informed and that their water usage would be environmentally friendly.

This research concludes that the awareness of the National Water Act (No.36 of 1998) is low and that the methods of making farmers aware of the legal requirements be implemented as recommended above. This will increase their motivation, knowledge and skills within environmental awareness spheres and will lead to the development of a holistic environmental awareness, and increased action in environmental friendly practice. This information if studied elsewhere, and offers similar results, can offer a baseline for national awareness level of the NWA and assist in directing awareness initiative plans of the act.

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ANNEXURES

ANNEXURE 1 - QUESTIONNAIRE

QUESTIONNAIRE – Knowledge of the farming community about the National Water Act and its water use requirements.

This questionnaire is made up of 4 Sections. They are as follows:

Section 1: Personal information
Section 2: Activity – this is to determine what the baselines of your current activities are.
Section 3: National Water Act – this is to determine your knowledge of the water use requirements.
Section 4: Impact of farming – to determine your understanding of the impact of farming on water resources.
Section 5: Challenges – to determine what challenges you are currently facing with regards to water in farming.

The questions are designed to understand what the current situation is within the area and to determine ways in which to improve.

Please could you fill in the **date** that you completed this questionnaire: __DD / _____ / 2017

SECTION 1: PERSONAL INFORMATION

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SECTION 2: ACTIVITY

In this section, please could you circle the appropriate option. If your option is not there, could you kindly fill out the 'Other' box.

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SECTION 3: NATIONAL WATER ACT

In this section you tick the box which is appropriate to the question. It is either a ***Yes or No*** *answer.*

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61 H ,e 3.5 !e'e%,e4 &3)! %&%&-D "e 7%& ! .! &3 "e""%.& !e*)%.&).)+e N)%.& * 9)e! A') /!. 7 &3 forma"#!nforma" !n$t!t%t!onB

Ye"	N.

71 D. 3.5 0&.8)+))+e 4e/%&%)%.& ./ 8)e! '.5!"eD " 4e/%&e4 =3)+e N)%.& * 9)e! A') @N. 36 ./ 1998A %" " /.**.8"B

Ye"	N.

81 9+) 4. 3.5 4e/%&e 8)e! '.5!"e "B
??
??

91 H ,e 3.5 +e !4 ./)+e N)%.& * 9)e! A') @N. 36 ./ 1998AB

Ye"	N.

101 H ,e 3.5 e,e! $$*%e4 /.! 8)e! 5"e *%'e&"eB

Ye"	N.
I/ Ye"D /.! 8+%'+ ')%,%)%e": ????????????????????????????? ??	

111 D. 3.5 0&.8)+e !eE5%!e 7 e&)" ./ 8)e! 5"e *%'e&"e $$*%')%.&B

Ye"	N.

121 D. 3.5 0&.8 3.5 !eE5%!e 8)e! 5"e *%'e&"e Se')%.& 21
I/ 3.5 @ A ta&e ' ater from a ' ater re$o%r(e
@=A $tor!n) ' ater
@'A !mpe e or !*ert t+e f"o ' of ' ater
@%A a"ter!n) t+e ,e - ,an&$- (o%r$e or (+ara(ter!$t!(of a ' ater(o%r$e

Ye"	N.

SECTION 4: IMPACTS ON THE ENVIRONMENT

In this section, please tick the option which is more appropriate to the current situation.

131 D.e" 3.5! / !7%&- ')%,%)3 + ,e &%7$ ') .&)+e e&,%!.&7e&)B

Reason for selection:
??

141 D.e" 3.5! ')%,%)3 + ,e &%7$ ') .&)+e $o!"B

Reason for selection:
??

151 D.e" 3.5! ')%,%)3 + ,e &%7$ ') .& 'aterB

Reason for selection:
??

161 D.e" 3.5! ')%,%)3 + ,e &%7$ ') .& p"ant$B

Reason for selection:
??

171 D.e" 3.5! ')%,%)3 + ,e &%7$ ') .& an!ma"$B

Reason for selection:

_____

181 D.e" 3.5! ')%,%)3 + ,e &%7$ ') .& ,!o !*er$!t. %& -e&e! *B

Reason for selection:

_____

191 D.e" 3.5! ')%,%)3 '.&)!%=5)e).)reen+o%$e)a$ em!$$!on$B

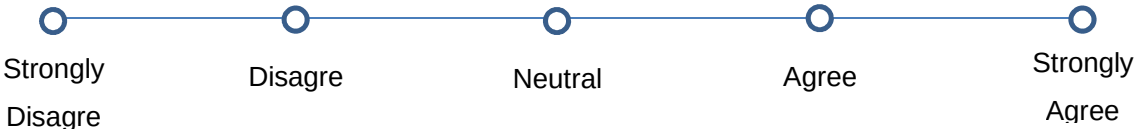
Reason for selection:

_____

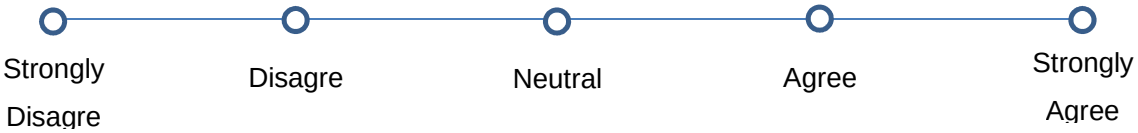
SECTION 5: CHALLENGES

This section is to determine what challenges you are currently facing with regards to water resources. Please select the option which is more appropriate to your current situation.

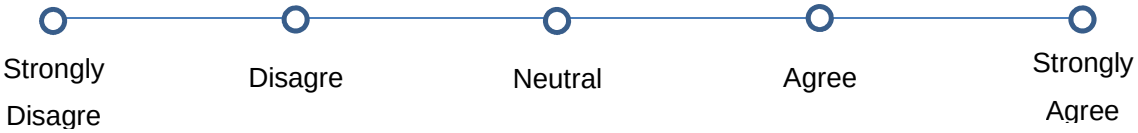
201 H ,e 3.5 e#$e!%e&'e4 &3 8)e! "+.!) -e"B



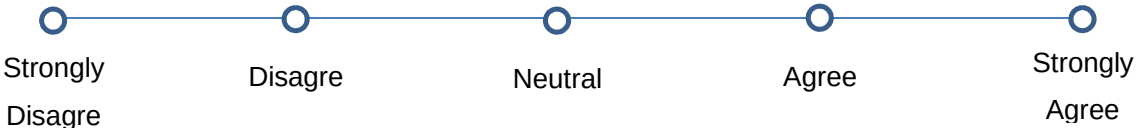
211 H ,e 3.5 e#$e!%e&'e4 &3 4e'!e "e %&)+e 8)e! E5 *%)3B



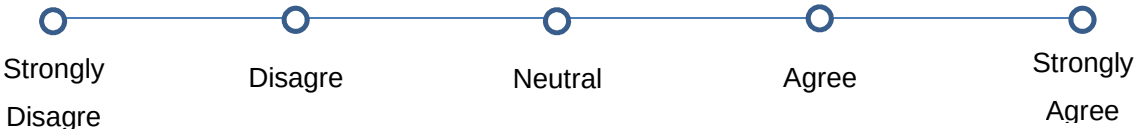
221 H ,e 3.5 e#$e!%e&'e4 &3 '+ &-e" %&)+e E5 &)%)3 ./ 8)e!B



231 H ,e 3.5 e#$e!%e&'e4 &3 '.&) 7%&)%.& ./ 8)e! !e".5!'e"B



241 I" 8)e! e "%*3 ''e""%=*eB



If you have any additional comments, please feel free to note them below:

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Thank you for your time and patience in answering these questions, it is appreciated.