

**UNDERSTANDING RESIDENTS' ATTITUDES TOWARDS PROTECTION  
OF WATER RESOURCES IN THE UPPER HENNOPS RIVER  
CATCHMENT OF SOUTH AFRICA**

By

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Integrated Water Management

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## **ABSTRACT**

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Environmental attitude is an essential concept and one that is regularly used in environmental research, social research as well as the global practices of environmental management. Due to the global nature of environmental problems, environmental attitudes became one of the significant research areas of interest among various disciplines during the latter decades. Several studies have been conducted in regard to environmental attitudes; yet many of these have given little consideration to investigating residents' attitudes towards the protection of natural resources, particularly water resources.

This study sought to understand residents' attitudes towards the protection of water resources in the upper Hennops River catchment area of South Africa. A survey method was utilised to carry out the study. Data was collected via a survey questionnaire that was physically delivered to respondents and collected through the same manner.

Three specific aspects of residents' attitudes towards the protection of water resources were investigated: (a) the perceived importance for protecting water resources in general and also for specific purposes; (b) the nature and extent of support for, and opposition to, various measures aimed at protecting water resources; and (c) the environmental values that form the basis of residents' attitudes towards protection of water resource environments. A quantitative analytical method was employed in order to draw significant conclusions of the research.

Overall, the study findings revealed that residents exhibit favourable attitudes towards the protection of water resources. Considerable support exists for water resource protection with

respect to: water resource quality protection; some specific regulations; and financing mechanisms – especially those that make polluters pay.

Resistance is, however, strongest towards: water/sewer charges, refuse collection, income taxes, property levies and paying for new developments. Findings also demonstrated that residents' attitudes towards water resource protection are governed by the ecocentric environmental values.

In light of these research findings, a balanced programme's underscoring the significance of a paying culture – which supports the protection of water resources, along with particular enforceable regulations and financing systems that make the polluters pay – are recommended. Moreover, a subjective comprehension of people's environmental attitudes along with inherited environmental values should likewise be considered in the development of water resource protection measures.

In sum, the findings of this research have implications for environmental attitude research in terms of understanding residents' environmental attitudes and also how further research on environmental attitudes may be carried out. The research also has implications for management of water resources. From a practical point of view, this research suggests that the understanding of residents' environmental attitudes should inform decision-making in the management practices of water resource environments.

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## DEDICATIONS

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*This thesis is dedicated to my parents, David and Maria Makondo*

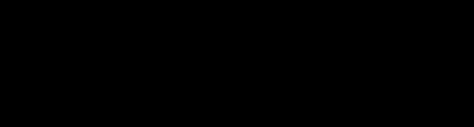
*- For their endless love, support and encouragement.*

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## DECLARATION

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I hereby declare that this thesis, submitted for the degree of Master of Philosophy in Integrated Water Management at Monash University, South Africa, is my own original work and has not previously been submitted for another degree in any other university.

Signature:.....  


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**1.1. Thesis overview**

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This dissertation is based on a study that sought to understand residents' attitudes towards the protection of water resources. To improve the understanding of residents' attitudes, this study assessed the nature and extent of attitudes based on two dimensions: the perceived importance of protecting water resources; and support for and opposition to different measures aimed at the protection of water resources.

To expand the knowledge in this regard, the study also examined the environmental values that govern residents' attitudes towards water resource protection. Given that the 'place of residence,' to a large extent, governs the social standing of people, along with their behaviours and attitudes regarding different facets of life; the study focused on a specific area: that is, the township community setting in the upper catchment of the Hennops River of South Africa.

Chapter one serves as an introduction to the study and it is written in five sections. Firstly, background information, pertaining to the main subjects of the study, is provided. Secondly, the problem that has led to the conception of this study is clearly stated. Thirdly, the three central questions sought to be addressed by this study are presented. Fourthly, a snapshot of the overall aim of the study is provided. To be precise, the expected contributions of the study to the research and the existing knowledge on peoples' environmental attitudes as well as water resource management practices are explained. Fifthly, this chapter closes with a presentation of the structure and organisation of the preceding chapters of the thesis.

## 1.2. Background

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*“In our country of about 50 million people, we face the challenge of freshwater scarcity, which is exacerbated by over–exploitation and pollution of its sources, its growing demand, unsustainable usage and wastage...In this regard; my department has developed innovative measures to ensure that there is adequate water of useable quality for current and future generations”*

(Edna Molewa, *The View from South Africa*. Stockholm Industry Water Awards: Sweden, 2011).

This excerpt from a speech by the former Minister of the then Department of Water and Environmental Affairs of South Africa, Mrs. Edna Molewa, captures the countrywide nature of water resource problems. The challenge of freshwater scarcity is not unique to South Africa: other counties around the globe also share the same dilemma.

A study by Papayannis and Pritchard (2008) demonstrated that, during the last century, water resources have been exploited and degraded in many parts of the world. In an endeavour to determine the source of the problem, Boyer and Polasky (2004) attributed the water resources’ problems to man’s need for modernity at the expense of the natural environment. With the already stressed state of water resources, the question of sustainable usage or conservation of these resources, and the ecosystem as a whole, has turned into an issue of worldwide concern (Papayannis and Pritchard, 2008).

The Water Research Commission (2005) reported that the issue of water resources’ degradation has increased in urgency in South Africa. In addition, toward the beginning of the new

millennium, it has remained the subject of significant consideration, which, subsequently, brought about the establishment of structures and other measures to manage water resources at a community level.

Since the establishment of the Catchment Management Agencies (CMAs), various other non-governmental associations and community-based groups have been further established through the initiatives of local communities in many parts of South Africa, assisting in dealing with wide range of conflicting interests about water resources. As mentioned in the above extract, efforts to protect water resources are developed with an end goal to ensure enough water of good quality for the benefit of present and future generations.

Generally, future generations are expected to benefit from present natural resources. In support of this perspective, Stern, (1992) argued that the responsibility of guaranteeing that future generations receive their share of today's natural resources lies on the current generation. In this regard, the innovative measures referred to in the Minister's speech involve regulations and other efforts that have been developed to create the basis under which water resources can be protected to ensure adequate water supply of useable quality for both current and future generations.

However, in order for water resource protection measures to perform their intended function, residents' support becomes a very important factor in this equation. Although sufficient proof exists that the South African public do value the natural environment in general (Adams, 2003; Struwig, 2005), real world evidence shows that particular regulations and policies aimed at natural resources' protection face some degree of criticism and opposition (Roberts *et al*, 2010). A study by Eagly and Chaiken's (1993) demonstrated that the degree of support or opposition towards an object is directly linked to the attitude of an individual; which they define as a

“psychological tendency that is expressed by evaluating a specific object with some degree of favour or disfavour”.

Suggestions have been made in regards to the connections between individuals’ attitudes and values and the degradation of water resources in many parts of the globe over time (Heberlein and Black 1976; Heberlein, 1981). As in any other countries around the world, in South Africa, the utilisation and protection of water resources appears to be connected, to some degree, to individuals’ common attitudes and values towards natural resources. Investigation of residents’ attitudes towards water resource protection is vital to improving the understanding of public actions and/or behaviour towards the natural resources’ protection.

Human geography – the branch of social science that that deals with the study of the earth’s environments and humans, and the interactions between them – has contributed enormously in the investigation of the vital relationship between humans and natural environment, particularly natural resources (Gibson, 2009). According to Pattison (1964), historically, human-to-environment connection has been perceived as one of the four main areas of study amongst human geographers since around the 1960s. In fact, even as far back as the 1900s (Gibson, 2009), the study of human attitudes towards natural resources has been a significant area of interest for the discipline of human geographers and other areas of social science

The applied nature of water resource geography, specifically, stresses the critical role of people’s environmental attitudes to the protection and conservation of water resources (Kates and Burton 1986). The interdisciplinary nature of this discipline gives a valuable perspective from which to investigate the interaction between humans and natural resources. The research presented in this dissertation has been undertaken within this disciplinary context and is directed specifically at

investigating residents' attitudes towards the protection of water resources in the upper Hennops River of South Africa.

### **1.3. Research problem**

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The deteriorating conditions of natural resources has become a global topic of concern and commanded even more public attention during the latter decades. In many parts of the globe, the persistent matters of concern around water resources, in particular, are much similar and include, among others, degradation and overexploitation due to the expanding economic demands as well as people's attitudes towards natural resources (Friedman, 2008; Welzer, 2012). Those are the main problems that remain of global concern on water resource environments today.

Given this worldwide environmental problem; environmental attitudes, likewise, became one of the significant research areas of interest among environmental managers and social scientists during the past few decades (Mitchell, 1997; Newhouse, 1990). From that point on, the collection of studies investigating individuals' attitudes, towards the natural environment, has risen and expanded significantly. Of late, numerous studies have been conducted between different fields to examine people's relations to the natural resources, among others (Darkey and Donaldson, 2000; Perez and Mabelane, 2001; Schults and Peall, 2001; Adams; 2003; Aoyagi–Usui et al, 2003; Johnson et al, 2005; Ryan, 2004; Struwig, 2005; Ignatow, 2006; Franzen and Meyer, 2010; Roberts et al, 2010; Kaiser et al, 2011; Takacs–Santa, 2007; Milfont and Duckitt, 2010).

The increase and expansion of research work in this discipline could be a reflection of the rising acknowledgment of the impact of the human aspect in problems relating to the natural



environment. Nonetheless, despite the significant number of studies and research investigating different aspects of environmental attitudes, few of these have given much consideration to understanding people's attitudes towards the protection of water resources in particular. In fact, not one particular study has focused on conducting an investigation into the nature and extent to which residents support or oppose different regulatory measures aimed at the preservation of water resources. This deficit in the consideration of matter has been a long-standing gap in this area of research. Thus, making a theoretical knowledge contribution to the aforementioned could benefit both the study of people's environmental attitudes and the management practices of water and other natural resources.

The study explores residents' environmental attitudes towards water resource protection in a catchment community setting, particularly the three townships in the upper Hennops River catchment. Specifically, this study investigates the nature and extent of residents' attitudes in view of two attitudinal dimensions: perceived importance for protecting water resources and extent of support for and opposition to different measures aimed at water resource protection.

To expand the knowledge in this regard, the study also examines the environmental values that govern residents' attitudes towards water resource protection. By focusing on these issues, the thesis intends to expand upon, and add to, existing research on environmental attitudes across the field of social science, and also in the management of environmental resources.

## **1.4. Research questions**

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The research presented in this dissertation sought to address the following three questions:

- a) What is the nature, and extent of, residents' attitudes toward protecting the conditions of water resources?
- b) What is the nature, and extent of, residents' attitudes towards measures aimed at the protection of water resources?
- c) What environmental values underlie residents' attitudes towards water resource protection?

## **1.5. Aim of the study**

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The overall aim of the study presented in this dissertation is to contribute to the theoretical knowledge on environmental attitudes in the field of social sciences. Precisely, this study aims to contribute to theoretical understanding of the role played by residents' environmental attitudes in terms of the protection of water resources. Also, this study hopes to contribute knowledge to the water resource management practices in South Africa, specifically in the upper Hennops River catchment. More specifically, the study aims to reveal and demonstrate information that could inform decision-making in the development of water resource regulatory measures.

## **1.6. Structure of the thesis**

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The thesis is organised in seven chapters:

Chapter one provided an introduction.

Chapter two presents a literature review of the applicable research and sociological theories on environmental attitudes. This chapter is written in six sections. Initially, the theoretical overview of the concept of attitude is presented, discussing the definition, overall structure and functions of attitudes. Second, research and theories on people's environmental attitudes are examined. More particularly, the definition and measure of environmental attitudes in the study of interrelations between the society and natural environment are considered. Third, the value system is discussed with a specific reference on the two orientations of environmental values that form the basis of peoples' attitudes towards the environment. Fourth, the theoretical framework adopted by this study is outlined. Fifth, the application of environmental attitudes concept into natural resources is explained. Sixth, this chapter is concluded with a summary and description of the significance of the literature to this specific study.

Chapter three of this thesis presents the research methods utilised to undertake this study. First, the survey design is outlined with specific reference to the structure of the questionnaire, types of question posed, scoring system as well as the administration method. Second, the sampling design is detailed; describing the survey sample, sampling design and the response rate. The scoring system is then also outlined. Fourth, the chapter presents the method of data analysis employed in order to draw conclusions from a large body of quantitative data. Fifth, the overview of ethical consideration is briefly discussed. This chapter closes with a summary of significant points discussed.

Chapter four presents the study area and is organised into four sections. First, the study area is discussed in relation to the South Africa's major catchment management areas. Secondly, the precise location of the study area is presented in terms of the location and demarcation in the

Gauteng province of South Africa. Third, this chapter provides a snapshot of South Africa's water situation, detailing water availability as well as the water resource policy context. Fourth, the overview of history of conservation in South Africa is presented. Finally, the chapter concludes with a summary of key points.

Chapter five presents the results of this research in line with the three central questions. First, results on the nature and extent of residents' attitudes towards the protection of the conditions of water resources are presented in the form of descriptive statistics and ranking of responses to question items representing different dimensions of attitudes towards water resource protection. Secondly, results on the nature and extent of attitudes towards measures aimed at the protection of water resources are described. The rankings of question items are summarised for the purpose of understanding the water resource protection efforts that are greatly supported, and those opposed by residents in the study area. Thirdly, the environmental values underlying residents' attitudes towards water resource protection are discussed. Descriptions of how scores from individual question items were consolidated and grouped into categories that represent the endorsement of either ecocentrism or anthropocentrism are presented. The fourth section concludes this chapter with a summary of the important points.

Chapter six embarks on a presentation of a discussion of the research findings outlined in chapter 5 and draws out some important conclusions. This is accomplished by blending the study findings in the context of the existing literature on environmental attitudes and conducting some work on environmental management. This chapter is written into four sections. First to be presented is the discussion on the nature and extent of attitudes toward the protection of the conditions of water. Secondly, a discussion of the environmental values that govern residents' attitudes towards the preservation of water resources is provided. Thirdly, the implications of the

study for environmental attitudes' research and water resource management will also be discussed. The last section wraps up the chapter by providing a summary of the main points acquired from the discussion.

Chapter seven concludes this thesis with a summary of research findings and suggestions for future research. Additional analyses of the established data – for both this research and further investigations requiring additional data collection efforts – will be outlined in this closing chapter.

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## **CHAPTER 2: LITERATURE REVIEW**

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### **2.1. Introduction**

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In chapter one, an introduction to this study was presented by discussing the background to the investigation, stating the research problem, outlining the research questions and providing the overall aim of the study. This chapter presents a literature review of the relevant research and sociological theories on environmental attitudes.

It is written in six sections. First, the theoretical overview of attitude is presented. Precisely, the definition, overall structure and functions of attitudes are discussed. Second, research and theories on environmental attitudes are considered. Third, the value system is discussed with a specific reference on the two orientations of environmental values that form the basis of peoples' attitudes towards the environment. Fourth, the theoretical framework adopted by this study is outlined. Fifth, the application of environmental attitudes concept into natural resources is explained. Sixth, this chapter is concluded with a summary and description of the significance of the literature to this specific study.

### **2.2. Attitude**

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The term 'attitude' is a vital concept that spans various fields of study, especially with regard to the discipline of social sciences. As indicated by McGuire (1986), the notion of attitude has been the predominant social science concept. Since the early stages of the discipline in the mid-1900s, interest in the investigation of attitudes has been generally far-reaching and evolving: from

scaling and measuring in the mid–1920s to 1930s; to those of change of attitude in the mid–1950s to 1960s; and also the structure of attitude in the mid–1980s to 1990s (McGuire, 1986).

### **2.2.1. Definition of attitude**

A derivative from the Latin word ‘aptus’, which means ‘apt/fit’, ‘able to adjust’ and ready to act’; the term ‘attitude’ has been defined by social science researchers from various disciplines in different ways throughout the years.

Pratkanis (1989) found that early utilisation of the term ‘attitude’ was diverse and comprised concepts such as: muscular readiness; dynamic motivation; cognitive set of mental procedures that decide on reaction. Lately, the definitions of attitude in the social science field vary in terms of the subject of interest and also in the manner in which the characteristics and essential aspects of the concept are comprehended.

In the mid–1930s, Gordon Allport (1935), a scientist known to have considered the investigation and study of attitudes an essential research area for social sciences; defined attitude as “a mental and neural state of preparedness, organised through knowledge and experience, and exerting a directive or dynamic influence upon an individual’s response to all objects and circumstances with which it is related”.

From that point forward, different definitions of the term ‘attitude’ have been suggested. Other scholars have defined attitude in relation to cognition and evaluation. For example, Anderson (1981) described attitude as “an integrated, cognitive and evaluative response to some information being received by a person about some attitudinal object”. Pratkanis and Greenwald (1989) recommended that attitude is ‘an individual’s evaluation of an object of thought’. Other

scientists have defined the concept of attitude in connection to individual's emotions. Moreover, others like Edwards, (1957), defined attitude as “a degree of a positive or negative effect related to certain psychological objects”. Also, Devine (1989) has described the concept of attitude as “an understanding of an evaluation or judgment that individuals may have about specific place, person, situation or object”.

Lately, Eagly and Chaikens (1993) defined attitude as “a psychological tendency that is expressed by evaluating a specific object with some degree of favour or disfavour”. This definition considers the evaluation of an object as an important aspect of attitude. In support of this, Albarracin et al (2005) put the argument forward that this definition maybe the most factual and formal for this concept of attitude. In addition, Milfont (2007) called for researchers' attention to be paid to this definition as well. In this manner, the definition of attitude by Eagly and Chaiken (1993) will be adopted in this research.

There are still numerous other definitions of attitude proposed in the literature of social science. From these definitions, Schwarz and Bohner (2003) have observed that the concept of attitude has lost quite a bit of its depth and has since generally been narrowed down to its evaluative component. Thus, despite the varieties among the definitions of attitude, in most recent definitions, there is a commonly held perspective of attitude as being evaluative. Ajzen (1989) noted that, even though the formal meanings of attitude differ; most current sociologists appear to agree that the representative attribute of attitude remains its evaluative dimension. In light of the above, to reiterate, the term ‘attitude’ is defined and understood as per Eagly and Chaiken's (1993) definition in this research.



### **2.2.2. Structure of attitude**

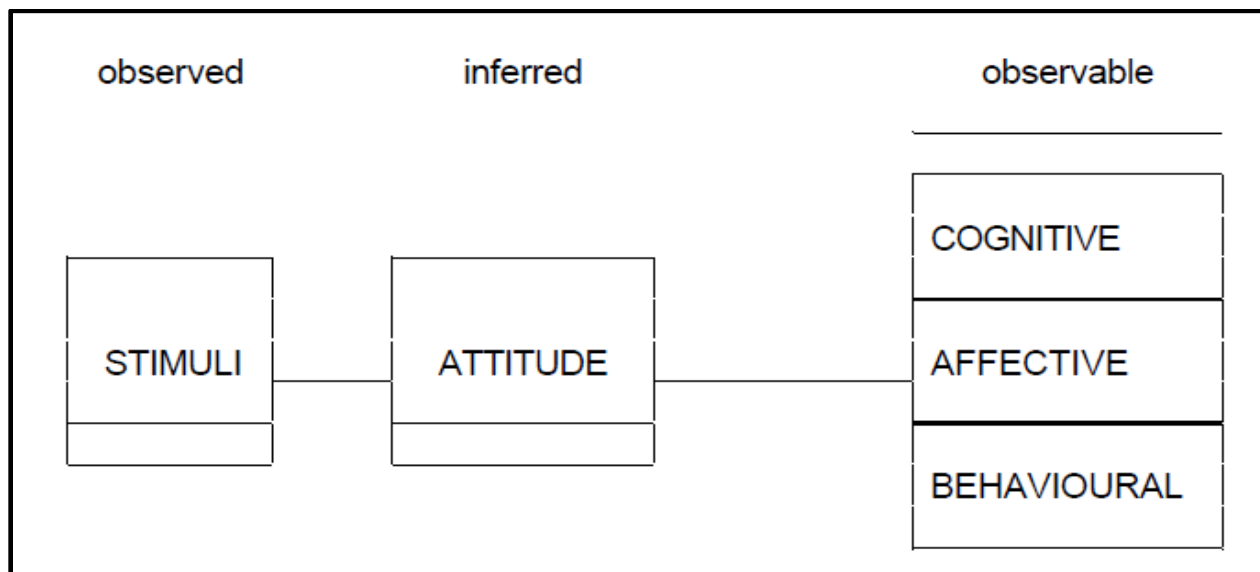
Attitude studies have benefitted from the advancement and utilisation of frameworks and models that break down and clarify various human psychological structures. Early research investigated attitudes utilising a one–component model that considers attitude as the effect produced where one is for or against a psychological object (Thurstone, 1931).

Other research on attitudes utilised a two–component model which involves cognitive and evaluative aspects of attitude (Vaughan and Hogg, 2005). In a two–component model of attitude, an attitude consists of a mental (psychological) readiness to act or behave in a particular manner and has a vast influence on evaluative response (Vaughan and Hog, 2010). The mid–1960s defined an era constituting a solid resurgence of interest in research about attitudes (McGuire, 1986). Thereafter, research on attitude’s structure concentrated on a three–component model that consolidated components of beliefs, feelings and behaviour (Fazio and Olson, 2007).

According to Fazio and Olson (2007), the most common framework for the investigation of attitude has always been the three–component model presented in figure 1. The three–component model views attitude as unobservable mental construct that can manifest itself in beliefs, feelings and behaviour. In other words, this model suggests that attitudes are cognitive, affective and behavioural measurements (Milfont, 2007).

The cognitive component of attitude may be derived from expressions of particular beliefs in light of perception, knowledge and information an individual has about particular attitudinal objects. The affective component of attitude may be drawn from verbal and/or non–verbal expressions of individuals’ feelings towards attitudinal object. The behavioural component of

attitudes may be seen from an individual's actions, including expressed intentions concerning an attitudinal object (Ajzen, 1989; Dunlap and Jones, 2002).



*Figure 1: Attitude as an inferred state with cognitive, affective and behavioural components (Borden and Schettino, 1979)*

The three-component model of attitudes gained popularity in the field of social sciences on the grounds that it not only laid the basis for study of numerous possibilities of attitude responses, but also served as a reliable template for investigating the formation of attitudes (Fazio and Olson, 2007).

The concepts that form the basis of this model are not new and have been in existence for a long time. In mid-1980s, McGuire (1986) noted that this tripartite model – of thoughts (beliefs), feelings (affects) and actions (behaviour) – was already well established. Since its establishment, the three-component model has regularly been utilised to organise psychological analyses of individuals (McGuire, 1986).

The three-component model is not, by any means, without flaws. For instance, Ajzen, (1989) noted that the evaluative aspect of the three-component model has been viewed as challenged

analytically in specific studies. Given the lack of extensive agreements over the terminologies utilised in this model, Pratkanis (1989) questioned the explanatory and predictive power of the three–component model above and beyond the justification of its three components.

Some questions have been put forward regarding specific presumptions that form part of this tripartite model. For example, towards end of 1980s, Zanna and Rempel (1988) made a comment that the given assumption of a connection between attitude and actions may hinder closer investigation of how and whether an individual’s attitude can predict the actions under different circumstances. Fazio and Olson (2007) likewise contended that the presumption that attitudes ought to have each of the three components is tricky, as other studies recommend that attitudes may be formed as a result of any one or mixture of the three.

Fazio (1995) re–evaluated the three–component model and recommended that attitude can be seen as relations in memory between the attitudinal object, in light of the cognitive, affective, and/or behavioural knowledge. Likewise, Zanna and Rempel (1988) contended that attitudes are classifications of an object, circumstance or issues alongside an evaluative dimension. They further argue that these classifications can be formed and established based on either one or a combination of the cognition, affect and behaviour components (Zanna and Rempel, 1988).

In addition, Milfont and Duckitt (2010) contended that several scholars now tend to hold the perspective that the three components – cognition, affect and behaviour – are the foundation from which the evaluative summary of a specific psychological object is basically derived, rather than being the components of attitudes. Drawing from the conventional three–component model of the structure of attitudes, the term ‘attitude’ can, in this way, be conceptualised as an

evaluative tendency that can both be deduced from, and have an impact on, beliefs, affect and behaviour (Milfont, 2007).

### **2.2.3. Function of attitude**

Alongside the theories on the structure of attitudes, theories concerning the functions of attitudes have likewise been proposed by scientists in the field of social sciences (Maio and Olson, 2000). Two influential theories that clearly deal with the functions of attitudes in individuals were initially developed and proposed by Smith et al (1956) and Katz (1960). These two influential theories have remained important to later studies on the functions of attitudes, continuing to influence later research on this subject. Thompson and Kruglanski (2000) contended that these old theories have survived the test of time, and continue to enjoy significant support among current researchers.

Smith et al (1956) noticed the lack of advancement in the theory of attitudes during the 1950s and tried to develop a theoretical framework for clarifying the relationship between attitudes and the personality of an individual. These scientists argued that attitude fulfills one, or any combination, of the functions of object assessment, social judgment and externalisation (Smith et al., 1956). Object assessment refers to the capability of attitude to summarise the positive and negative qualities of objects in the natural environment: that is, attitudes make individuals able to approach things that are beneficial to them and avoid anything that which is bad. With regard to social adjustment, attitudes help individuals associate with other individuals whom they like, and separate themselves from those they dislike. Externalisation is served by the attitude that helps to defend oneself against internal conflicts.

Katz (1960) likewise proposed a comparative theoretical framework for the examination of attitude dynamics. He suggested that the formation of a specific attitude may be described by the functions that the attitude performs on an individual. This theoretical framework recognised four psychological functions of attitudes: (a) the adaptative function, which satisfies the utilitarian requirements; (b) the ego defensive function of dealing with internal conflict; (c) the value expressive function that maintains self-identity and enhances self-image; and (d), the knowledge function, which gives meaning and understanding of the uncertainties of the world (Katz, 1960). Katz (1960) further argued that attitudes play a significant role in the formation and changes of an individual's opinion.

Recent work by Herek (1987), Fazio (2000), Shavitt and Nelson (2000), also analysed the functions of attitudes. Fazio (2000) investigated the object assessment function of attitude and recommended this to be the central function of attitude. Fazio (2000) argued that, even though other different studies suggested other possible attitude functions, the object assessment function is unique because it relates to the overall utility of holding the attitude. Therefore, every attitude, irrespective of any other possible functions it may provide, serves the primary function of object assessment (Fazio, 2000).

Shavitt and Nelson (2000) also investigated the social identity function of attitude and centred their exploration on the person as an observer (of another attitude holder), and the kinds of information and deductions drawn by the observer about the attitude holder. They recommended that attitudes may assist to convey a wide range of information about the attitude holder to the observers. Accordingly, individuals may express specific attitudes in order to impart something about themselves to the observers. They clarified that the social identity function of attitude

alludes to the information of an individual's attitude through his/ her impressions (Shavitt and Nelson, 2000).

Herek (1987) recognised three functions of attitude: the self-expressive function, the defensive function and the experiential-schematic function. Herek (1987) argued that functions of attitude are not determined only by the characteristics of an individual. They are affected by the socially constructed meanings that surround the domain of the attitudinal object. Many objects hold various meanings through different social encounters. A single object can have different functions because it is characterised in various ways (Herek, 1987). He further argues that the place of residence, time, social setting and other conditional qualities in which attitudes are framed and expressed have a direct impact on the functions of such attitudes.

The fundamental theories on attitudes' functions recommended by Smith et al (1956) and by Katz (1960); and, recent theoretical developments of the subject by Fazio (2000), Shavitt and Nelson (2000), and Herek (1987) seem to have comparative concepts and views. For instance, object assessment established in the theoretical framework of Smith et al (1956), and later discussed in the study by Fazio (2000), is comparable to the adaptive and knowledge functions described in the study by Katz (1960) and the function of experiential-schematic suggested by the work of Herek (1987). The suggestion by Katz (1960) and Herek (1987) that attitudes perform the function of defence might likewise be compared to the idea of Smith et al (1956) in relation to externalisation. The thoughts of social adaptive and value expressive functions of attitudes by Katz (1960) and Smith et al (1956) may likewise be seen mirrored in the theory of the social identity function of attitude by Shavitt and Nelson (2000).

Given such comparisons and similarities, the functions of attitudes may be comprehensively summarised into four main functions. In the first place, attitudes serve the function of providing people with a reliable frame of reference by permitting individuals to categorise and organise attitudinal objects in their surroundings in a more meaningful manner. Secondly, attitudes serve the function of summarising the outcomes and experiences related to certain attitudinal objects. Third, attitudes serve as the establisher of self-identity, facilitator of self-expression, and mediator of social-interaction. Fourthly, attitudes function to: uphold the individual's self-esteem, defend the ego arising from the internal conflict, and assist individuals to deal with anxieties (Maio and Olson, 2000; Milfont, 2007; Shavitt, 1989).

### **2.3. Environmental attitudes**

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Environment attitudes have turned into an important subject of interest in many studies related to the natural environment. An estimation made by Dunlap and Jones (2002) has demonstrated that, by the end of 1970s, researchers, from a variety of disciplines, have published over three hundred studies related to environmental attitudes, as well as environmental concerns. This section reviews literature on social science theories, and the related environmental attitudes, particularly those that are important to this study.

#### **2.3.1. Definition of environmental attitude**

A diversity of terms has been utilised by theorists and researchers in the field of sociology to refer to individual's feelings, beliefs, and intentions towards the environment. In any case, environmental attitudes and concerns are the terminologies that seem to be the most generally utilised in the literature of social sciences (Milfont, 2007). For instance, several articles that have

been published utilised the term ‘environmental attitude’ (Heberlein 1981; Yin 1999; Schultz et al, 2004; Milfont and Duckitt, 2010). Other different publications employed the term ‘environmental concern’ (Ester and Van der Meer, 1982; Dunlap and Jones, 2002; Huddart–Kennedy et al, 2009). From one perspective, the terms ‘environmental attitude’ and ‘environmental concern’ have been viewed as one and the same in specific cases. Then again, these terms have further been differentiated in other studies.

A study by Heberlein (1981) explored environmental attitudes at a general level to find how this concept relates to the body of social science theory of attitude. Heberlein (1981) defined environmental attitude “as an organisation of individuals’ beliefs, including evaluations, likes and dislikes for some parts of the environmental or the whole environment”. According to Yin, (1999), environmental attitude is an individual’s cognitive, affective and evaluative alignment towards the objects related to the environment. Likewise, Schultz et al. (2004) recommended that environmental attitudes allude to “the collections of beliefs, affects and behavioural intensions that an individual possesses with respect to activities related to the environment”. More recent studies define environmental attitude as a “psychological tendency that is expressed commonly by evaluation of the natural environments with a degree of favouring or dis–favouring” (Milfont and Duckitt, 2010).

Simultaneously with the work of Heberlein (1981) on environmental attitudes, Van der Meer and Ester (1982) laid out a model of determining the environmental behaviour based on the findings of their study about environmental concern. They described environmental concern as the extent to which an individual recognises the environmental issues and is prepared to take part in finding the solution (Van der Meer and Ester, 1982). On the other hand, Dunlap and Jones (2002) described environmental concern as the extent to which individuals know about issues relating to



the environment and express support of efforts aimed at resolving them, or even to indicate the eagerness to personally contribute to the solution. Other late definitions of environmental concern are vague. For example, Huddart–Kennedy et al (2009) defined environmental concern as “a suite of qualities, perspectives, attitudes and behaviours that mirror the individual’s concern about the environment”.

Researchers have drawn a clear difference between the two terms, positioning environmental attitudes in the theory of attitudes and describing the term ‘environmental concern’ as an individual’s concern about the problems and issues pertaining to the environment (Schultz et al, 2004). However, Dunlap and Jones (2002) argue that environmental attitude and environmental concern may be considered similar in specific cases, with both terms alluding to attitudes towards situations, objects and actions related to the environment. They found that environmental concern in several studies is based upon on different forms of theories of attitudes: for example, “the conceptualisation of the concept of concern with regard to the cognitive, affective and behavioural components of the three component model of attitudes” (Dunlap and Jones, 2002). However, Dunlap and Jones (2002) mentioned that environmental concern definitions have been explained in terms of the theory of attitudes. They concluded that differences in research regarding the term ‘environmental concern’ may have been originated from the manner in which the concern component of ‘construct’ is conceptualised (Dunlap and Jones (2002)

For purposes of clarity, this study will make use of the term ‘environmental attitude’. In this manner, the term ‘environmental attitude’ will be defined as a psychological tendency that is expressed by the evaluation of the natural environments with a degree of favouring or dis-favouring (Milfont and Duckitt, 2010).

### **2.3.2. Measures of environmental attitudes**

Environmental attitudes have been measured in various ways within the social science discipline. Stern (1992) refers to the vast amount of available and accessible measures of environmental attitudes as ‘anarchy of measurements’. Heberlein (1981) likewise observed that, on one hand, there have been studies dedicated fundamentally to creating standardised measuring scales for environmental attitudes in light of the key components of the theory of attitudes; yet, on the other, numerous environmental attitude studies tend to utilise the ad hoc measures and scales developed purposefully for a specific study.

Since environmental attitude is seen as a hypothetical state of mind underlying an individual’s behaviour towards the environment, no single behaviour yields a specific good measure of environmental attitude. Along these lines, measuring scales have been used to investigate environmental attitudes over the years (Maloney and Ward, 1973; Dunlap and Van Liere, 1978; Weigel and Weigel, 1978). The objective of the scaling system is to obtain a measure of construct, under the presumption that all errors related to the responses to every item offset one another, over a vast number of measuring items. This model of scale arises from a large collection of literature known as ‘the test theory’ (Magnusson, 1967; Lord and Novik, 1968; Nunnally, 1978). The attitude scale reduces an individual’s environmental attitude into a single quantitative score of one number. Clearly, this is a representation which can be used to compare communities as well as individuals effectively. This study utilises the attitudes scale that is designed only for its own purpose.

## 2.4. Value system

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Values are the patterns in which people orientate themselves and adjust to their surrounding environments. These patterns are defined by Tolman (1951) as “fundamental conceptions towards life which subsequently underlie people’s behaviour or actions towards some objects”.

Values are equally self-centred and social-centred because they shape the manner in which an individual interacts with the society. As a general standard of orientation, values incorporate social-centred and external aspects to the extent that they are efficient as guiding principles for individual’s behaviour and are established within the social environment. However, they also consist of self-centred aspects as a standard adopted and accepted by an individual. Grunert and Kristensen, (1994) argued that values are dynamic mental constructs. They are presumed to be connected indirectly to individual’s behaviour, that is, they are supported by beliefs which are regarded as a stronger mental construct.

Since values function as a frame of reference for evaluating the situation, other people and oneself to guide actions, they also embody emotions. In other words, as a motivating force for the behaviour, they clearly present the cognitive–affective categories. Generally, those categories constitute the cultural context of a given community. When a culture is referred to as ‘shared meanings’, from a cognitive–affective perspective, it could be therefore defined as ‘collective shared cognitive–affective structures’. The more aspects of cognitive–affective categories are shared by a community, the more relations between them are similar. Also, the more the aspects of cognitive–affective categories differ between two or more communities, the more their cultures vary. Differences in individuals’ values are therefore differences in individuals’ mutually shared cognitive–affective structures. For the purpose of this research, values will be

defined as “cognitive–affective categories of the abstract with a strong component of evaluation” (Tolman, ;1951; Grunert and Kristensen, 1994).

#### **2.4.1. Environmental values**

It is frequently suggested that environmental attitude and environmental behaviour are associated with individuals’ environmental values (Dunlap et al, 1983; Karp, 1996; Stern, 2000; Schultz and Zelezny, 1999). Environmental values are commonly conceptualised as “the essential standard that serves as a guiding principle on how individuals view and interact with the natural environment” (Rokeach, 1973).

In that capacity, environmental values may provide the basis for formation of environmental attitudes and serve as a guiding principle for environmental behaviour. That is, individuals consider the implications of their behavioural choices on something they value. In connection to environmental issues, which frequently emerge from the conflict of interest among individuals, environmental values may play a significant part (Axelrod, 1994; Karp, 1996). Favourable behaviour towards the environment may arise from environmental values that exceed self–interest and visa versa.

Numerous studies have investigated the concept of environmental values. The work of Dunlap and Van Liere, (1978); Tompson and Barton (1994); and Dunlap et al. (2000) suggest two types of environmental values that frame people’s attitudes towards the protection and preservation of the natural environment. This involves both anthropocentrism – that which is human–centric – and ecocentrism – that which is primarily focused on ecology. Both the anthropocentric and ecocentric individuals demonstrate favourable attitudes towards environmental resource

protection: the distinction between these two orientations lies in the reasons provided for supporting the protection of such resources.

Ecocentric individuals value the natural environment for its own specific purpose, along these lines: they believe that nature deserves to be protected because of the intrinsic value of its own. They further make the presumptions that there is a limited point to the development of and the carrying capacity of the earth, that the balance of nature can be effectively distressed and not immediately cured (Dunlap and Van Liere, 1978; Dunlap et al., 2000).

In contrast, anthropocentric individuals value the natural environment merely because of the physical or materialistic resources that it provides in sustaining the quality of life for people. According to Pirages and Ehrlich (1974), the following principles are the key to anthropocentrism: beliefs in advancement and development; confidence in science; innovation and technology; materialism; and also a perspective of nature being regarded as something to be ruled by people.

Both anthropocentric and ecocentric individuals demonstrate concern toward natural environmental issues. However, their motives underlying this interest are fairly distinguishable. Anthropocentric individuals support the protection of natural environment on the basis that peoples' health, comfort and quality of life can rely on the protection of natural resources, as well as belief in the importance of facilitating a healthy ecosystem. For instance, the pollution of air can easily subject humans to difficulties breathing and associated health issues. In addition, the destruction of natural forests may prevent the development of new medicines and other pharmaceuticals that could possibly save people's lives. As a third example, exhaustion of coal and oil related fuels may drastically drop the modern standards of living. Thus, anthropocentric

reasons for preservation of the environment are largely driven by ensuring desirable human living standards, with the secondary motive of the preservation of the environment.

On the other hand, ecocentric individuals support environmental protection in light of the view that environmental resources are worth protecting, irrespective of the lifestyle or economic implication of protection. To ecocentric individuals, the natural environment has intrinsic value and their endorsement thereof has a spiritual dimension. As opposed to anthropocentric individuals, this group emphasises the natural linkage between people and other features of nature that exceeds the capability of environmental resources to fulfil the physical or materialistic needs of humans.

Ecocentric individuals would apparently be in agreement with anthropocentric individuals that environmental issues require the utmost attention in order to sustain human wellbeing and the adopted quality of life. Nevertheless, the distinction remains that ecocentric individuals feel that, in spite of these issues, it is important to protect the natural environment based on its own transcendental dimension.

The difference between anthropocentrism and ecocentrism dates back decades. The two attitudinal orientations are similar to other two philosophical perspectives of human-to-environment relationship presented by Stokols (1990). Instrumental individuals, like anthropocentric individuals, view the natural environment as capital intended to be utilised to achieve certain goals, and does not have its own particular worth. Mystical individuals, similar to ecocentric individuals, judge the natural environment as a setting for enhancing human soul and possessing its own worth independent of the contributions towards satisfying human physical needs.

Likewise, the analysis of environmental ethics by Seligman (1989) provides a difference between the utilitarian view of the natural environment and views that are rooted in giving attention to components of the earth that are non-human. Anthropocentric individuals are merely utilitarian: environmental resources are basically valued for their contribution towards satisfying human desires. Ecocentric individuals' view is that the value of environmental resources is autonomous and should obtain ethical attention in its own right.

Other studies have demonstrated that environmental values are associated with conservation behaviour and the willingness of people to engage in the protection of the environment (Dunlap et al, 1983; Stern and Dietz, 1994). In this study, residents' environmental values will be investigated in order to enhance the understanding of attitudes towards the protection of water resources.

#### **2.4.2. Measure of environmental values**

The global nature of environmental issues turned out to be more evident during the 1970s with the growing awareness of a problematic relationship between the natural environment and the modern industrialised society (Stern et al., 1992). Before the 1970s, anthropocentrism was a dominant environmental value across the world (Tompson and Barton, 1994). Toward the end of the 1970s, an extensive number of individuals recognised that human actions were having a hugely negative effect on the natural environment and that there was critical need to shift to a more sustainable practice of development.

To capture the shifting patterns in people's environmental values, sociologists, Dunlap and Van Liere (1978), investigated the aspect of increasing ecocentric environmental values that started to gain momentum towards the end of 1970s. Based on the aspects of attitude theory, they invented

a tool to measure the degree to which individuals acknowledged the New Ecological Paradigm (Dunlap and Van Liere, 1978). This was named the 'New Ecological Paradigm scale' (NEP scale). Bell et al, (2001) mentioned that, since its invention, the NEP scale has been the best known measure of environmental attitudes for many years.

As a measuring tool, the 12-item Likert-type NEP scale is designed to measure the general beliefs of individuals about their relationship with the environment. The NEP scale is made out of the question items that refer to wide environmental problems: for example, the balance of nature, limits to growth, and individual's rights to rule and modify the natural environment (Dunlap and Jones, 2002; Dunlap and Van Liere, 1978; Hawcroft and Milfont, 2010). This measuring scale makes use of the number scoring system; whereby a higher score on the scale indicates an orientation towards ecocentric values, which, in turn, reflects some degree of commitment to the protection and conservation of natural resources (Hawcroft and Milfont, 2010). The lower scores on the NEP scale indicate an anthropocentric value inclination which mirrors some degree of commitment to the exploitation of natural resources. The NEP scale has appeared to have some significant consistency and a satisfactory level of measuring predictive construct and content validity (Dunlap and Van Liere, 1978).

The NEP scale has been revised several times over the years, and, consequently, in 2000, Dunlap, Van Liere, Mertig, and Jones (2000) published the latest 15-item version of the revised NEP scale. The amended scale includes a more extensive scope of environmental perspectives, and two new attitudinal aspects towards the environment were included (Dunlap et al, 2000). The first was an attitudinal item that measures the extent to which individuals feel about the perspective that modern culture is exempted from the constraints of nature. The second was an item that focuses on the belief of managing the probability of an ecological crisis of nature (Dunlap et al, 2000).



Whereas the first scale utilised selecting the option of: ‘strongly agree’, ‘mildly agree’, ‘mildly disagree’, and ‘strongly disagree’ as reaction choices for all attitudinal items; in the amended version, an unbiased alternative of ‘uncertain’ was added to the other options so as to avoid a forced position. However, the neutral alternative may make create another problem by giving respondents a simple ‘way out’ when replying. The most recent version of the NEP scale is exclusively aimed at measuring the individual’s endorsement of ecocentrism or anthropocentrism (Dunlap et al, 2000).

In sum, since its initial distribution, the NEP scale has always been recognised as a standout amongst other different scales used to investigate individuals’ attitudes towards the environment (Stern et al., 1995). Since it was amended in 2000, the NEP scale has even turned into the most utilised measure of residents’ environmental attitudes in many studies in many countries (Dunlap, 2008). The NEP scale has given an extremely helpful measurement in investigating environmental attitudes and moral positions on human–environment relationships. Specifically, the NEP scale will be utilised in this research with the end goal of understanding the philosophical views that underpin individuals’ attitudes towards the protection of water resources.

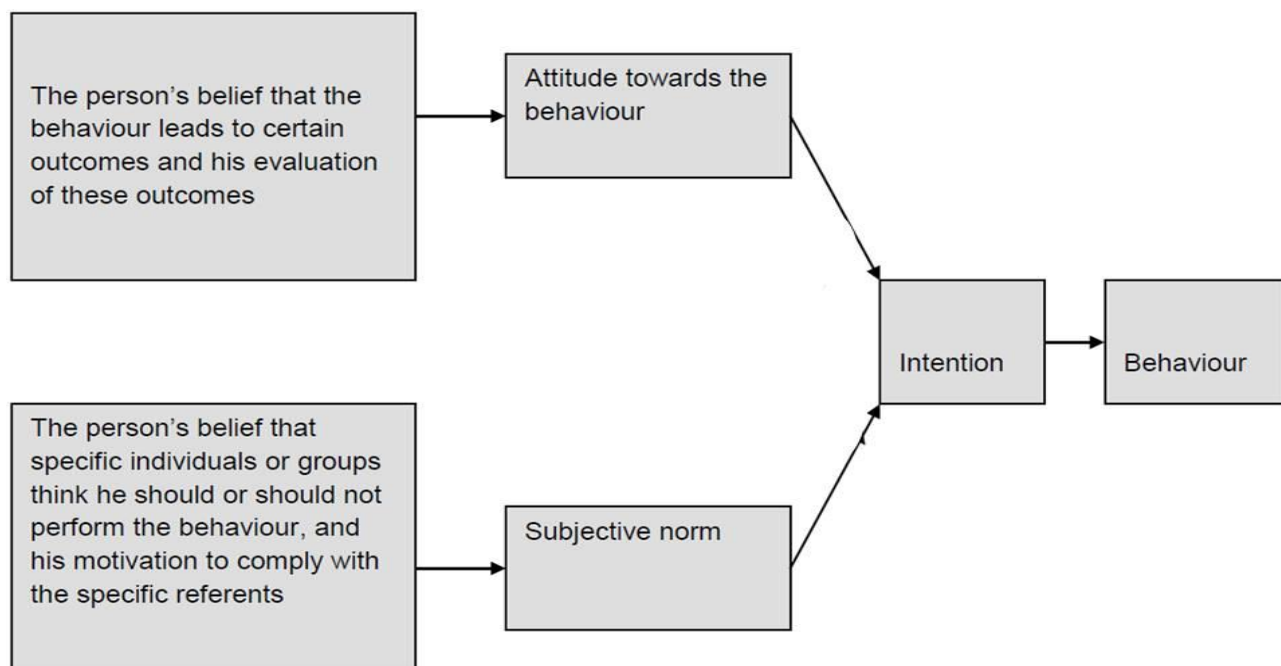
## **2.5. The theory of reasoned action**

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A review of literature in the field of social sciences suggests that the study of human behaviour has been of specific interest to scientists since the turn of the 20th century. Numerous theoretical models have been established to understand human behaviour, but one particular theory has presented how its approach can assist to incorporate different theories and lines of study in the area of attitude – the theory of reasoned action. The theory of reasoned action (Ajzen & Fishbein,

1980) was initially introduced by Martin Fishbein in 1967 in an endeavour to understand the complex correlation between human attitude and behaviour. It was conceived out of frustrations arising from the recurring failure to predict human behaviour from traditional attitude measures (Fishbein, 1993). As indicated by Ajzen and Fishbein, the theory of reasoned action depends on the assumption that humans are rational and can make systematic use of available information. Individuals consider the consequences of their actions before they choose whether or not to perform a certain action. The theory of reasoned action endeavours to clarify the complex correlation between attitudes, beliefs, intentions, and behaviours. According to this particular theory, the most instant determinant of human behaviour is behavioural intentions. The direct determinant of an individual's behavioural intentions is the attitude towards performing a particular behaviour as well as the subjective norms related to the behaviour (Ajzen & Fishbein, 1980; Montano & Kasprzyk, 2002).

A schematic representation of the theory of reasoned action is shown in figure 2 below.



*Figure 2: The theory of reasoned action (Ajzen and Fishbein, 1980)*

As shown in figure 2, there are two determinants of behavioural intentions: the attitudinal or personal component, and the normative or social component.

The attitudinal component of this theory refers to an individual's attitude towards performing a behaviour under particular thought or consideration (Ajzen & Fishbein, 1980). The likelihood of individuals performing a particular behaviour will be solid if they possess favourable attitudes towards performing that behaviour. Fishbein (1993) presented a clear distinction between people's attitudes towards an object (for example, attitude towards water resources) and people's attitudes towards a behaviour (for example, attitude towards protection of water resources) in relation to an object. As indicated by Ajzen and Fishbein, people's attitude towards a behaviour (for example, support for water resource protection measures) is a more reliable predictor of the behaviour than people's attitudes towards the target of that behaviour (for example, clean and health condition of water resources). Thus, the attitude towards maintaining a clean and healthy condition of water resources is a poor predictor of water resource protection behaviour, and the attitude towards supportive behaviour is likely to be a better predictor.

The subjective norm is the second determinant of behavioural intention which refers to individuals' perceptions of the social or societal pressures to behave or not to behave in a particular manner. The subjective norms are controlled by whether the important referents support or do not support the performance of a particular behaviour, weighted by the motivation to conform to those referents. Those beliefs that underlie individuals' subjective norms are called normative beliefs. In this manner, people who believe that important referents think that they should engage in a specific behaviour (for example, support for water resource protection efforts)

are encouraged to conform to the wishes of those referents and will thus possess a positive subjective norm. The theory of reasoned action makes an assumption that there is a causal chain that connects behavioural and normative belief to behavioural intentions, and behaviour through attitude and subjective norm. This suggests that individuals are more likely to engage in a particular behaviour when they first assess it positively and also believe that important referents think they ought to perform it (Ajzen & Fishbein, 1980; Montano & Kasprzyk, 2002).

The theory of reasoned action was selected for this particular study, as it is the theory most cited in environmental attitude research and has been found to be a better predictor of people's environmental behaviour than any other model (Fishbein, 1993). Debatably, South Africans have been and still are exposed to adequate information on protection of natural resources. There is an essential need to shift towards behaviour change. Because beliefs and attitudes have appeared to be important in individuals' choices of actions, the theory of reasoned action is relevant to this change in behaviour.

## **2.6. Environmental attitudes and values towards natural resources**

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Since the early 1950s, the level of people's concern about environmental resources has gradually expanded. This expansion is apparent from the increase in global collaborations, the increase of global non-government organisations, the number of nationwide environmental ministries, as well as the growing number of studies concerned about the environment, particularly natural resources (Franzen, 2003). Internationally, policy campaigns strategies and media efforts are being used to motivate individuals to change their attitudes and value the natural environment, to persuade individuals to purchase products that are environmentally friendly, to reuse recyclable material, and to preserve natural resources. Scientists are also conducting more studies in an

effort to gain more understanding of the complex relationships between environmental values, attitudes, beliefs, and environmental concern.

As outlined by Heberlein (1991), environmental attitudes are very essential, extensively debated, repeatedly measured, and inadequately understood. He contends that this is partially because the concept of environmental attitude is very unique from other researched topics in the field of social sciences. The environment as a complex object is always present and consists of numerous sub-objects that do not, as separate objects, represent the total picture. Different theories have been established in an endeavour to understand the complex correlations that exist between environmental attitudes, environmental values and the demonstration of protection behaviour towards natural resources. Even though several studies have been conducted in this regard, no conclusive answers to this have thus far been found. This study looks at people's attitudes, a variable that has been found in literature to have a positive and/or negative impact on protection of natural resources (Kollmuss & Agyeman, 2002).

Studies by Inglehart (1997) demonstrated that the manner in which individuals view the natural environment is to some extent reliant on the availability of material resources to a member of society. In the event that individuals' lives are characterised by a struggle to find material goods, values that reflect scarcity are largely held. People who are always preoccupied with their survival material goods have much less concern for natural resources and see nature as containing resources to be utilised. Unprivileged people who live in a circumstance of hardship and poverty are more likely to consider jobs and food as more significant than issues facing natural resources. Be that as it may, if individuals' essential needs are fulfilled, it is highly likely that they will embrace values and attitudes that promote protection and conservation of natural resources. This proposition is analogous to Maslow's hierarchy of needs, which states that basic

human needs (security, food, and shelter) are satisfied first before spiritual and intellectual self-actualisation can happen. This theory therefore predicts that individuals from generally wealthy social orders are concerned about and support protection of natural resources more than individuals from societies that are economically deprived.

Numerous researchers have criticised Inglehart's study. Dunlap et al. (1993) have presented some evidence obtained from 24 nations that took part in the Health of the Planet (HOP) survey. The survey's findings demonstrated that many items of the HOP measuring tool that quantify environmental attitudes and concerns were not consistent with the country's Gross National Product (GNP). From that point forward, Dunlap and Mertig (1997) concluded that environmentalism is a worldwide phenomenon which in numerous occasions cannot be associated with the GNP per capita of a country. While examining the World Value Survey information, Brechin and Kempton (1994) established that support for natural resource protection did not efficiently differ amongst low and high-income nations. They concluded that privileged circumstances (affluence) are not a requirement for support regarding protection of a natural resource. More firmly, Schultz and Zelezny (1999) recommended that the outmoded wisdom suggesting that environmental concern is a luxury only afforded by the wealthy is groundless across all cultures.

The main alternative to Maslow's theory of hierarchy of needs has been the theory of environmental deprivation. This theory suggests that daily human survival may bring about a hierarchy of needs which compromise protection of natural resources yet asks what happens in an instance where the filthy environment turns into a concern for survival in itself. The focal

point of this theory suggests that the more someone is exposed to some sort of pollution, or any type of environmental problem, the more the concern towards the environment and related natural resources. The theory of environmental deprivation suggests that individuals who live in degraded and polluted regions get so used to the circumstances and that the outcries are more likely to originate from individuals who live in cleaner regions and who get to be exposed to the filthy side (Whittaker et al., 2003).

As outlined by Grafton and Knowles (2004), environmental attitude is part of a bigger set of values, and it is not just determined by wealth. Social-related values are constantly entrenched in a bigger cultural background. As a result, people's values vary based on the degree to which they are "central" within a society, that is, whether peoples' values are broadly shared amongst and viewed as essential by members of the society and whether values are mirrored in various institutions and practices.

## **2.7. Conclusion**

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This chapter looked into the general social science literature on attitudes, particularly environmental attitudes, which are specifically relevant to this study. An extensive search of the various and broad body of social science literature on this topic was conducted. An appreciation of previous research work in this field served three principle purposes for this study: Firstly the review of existing work in this field provided good guidance in the development of data collection tools; secondly, it played a vital role in maintaining the sense of topic's perspective throughout the study; and, lastly, it expanded the opportunities for formulating critical analyses of the real meaning of the collected data during the data analysis stage.

Specifically, the review of literature explored the following, mainly based on the theory of attitudes: (a) the definitions, structures and functions of attitudes in general; (b) the descriptions and measures of environmental attitudes; and (c) environmental values that underlie residents' attitudes and also the associated method of measurement.

It was noted in this chapter that the definition of attitude changed over time. Presently, numerous definitions for attitudes and environmental attitudes may be found in different social science studies. For the purpose of this study, the term 'environmental attitude' is defined as a 'summary of people's evaluations with respect to the natural environment and its dimensional attributes' (Heberlein, 1981; Yin, 1999; Shultz et. al, 2004; Milfont and Duckitt, 2010). The attitude construct has been discussed in light of the three components' model.

Also, the psychological functions played by attitudes were outlined: firstly, attitude functions to provide people with a frame of reference; secondly, it summarises the outcomes and experiences related to an attitudinal object; thirdly, it establishes self-identity, facilitates self-expression; and, fourthly, attitude mediates social-interaction, maintains the individual's self-esteem and defends the ego arising from internal conflict.

Environmental attitudes have likewise been discussed in relation to the theory of attitude in social science. Scientists within this discipline have developed a wide range of measures for investigating environmental attitudes which have been utilised in previous research. This study, in particular, utilises the attitude scale designed only for its own purpose.

This chapter also made an explicit distinction between the environmental psychological views that form the basis of individuals' attitudes toward the natural environment: an anthropocentric view of valuing the environmental resources basically for what it contributes towards satisfying



human requirements; and an ecocentric view of valuing the environmental resources for its own intrinsic value.

To capture residents' orientations in terms of the environmental values, this study has adopted the New Ecological Paradigm scale as a measuring instrument. The next chapter describes the area of study in the context of South Africa.

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## **CHAPTER 3:                    STUDY AREA**

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### **3.1.    Introduction**

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Chapter two was a presentation of the literature review of the applicable previous research work and sociological theories on environmental attitudes. This chapter presents the study area and will proceed as follows. Firstly, the study area is discussed in relation to the South Africa's major catchment management areas. Secondly, the precise location of the study area is presented in terms of the location and demarcation within the Gauteng province of South Africa. Thirdly, the chapter provides the snapshot of South Africa's water situation, detailing the water availability as well as the water resource policy context. Fourthly, the overview of history of nature conservation in South Africa is presented. The chapter then concludes with a summary of key points.

### **3.2.    Study area in the context of South Africa's major catchments**

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Figure 3: Study area in the context of South Africa's major catchments (DWAf, 2004)

As for freshwater systems, such as large rivers and their related small tributaries are concerned, South Africa comprises 19 major freshwater catchments (figure 3 above). Sampson (2001) mentions that the National Water Resource Strategy (NWRS, 1999) in relation to the National Water Act (NWA, 1998) divides the country into 19 water management areas in terms of the major catchments. In this regard, every major catchment is also a recognised area to be managed by the Department of Water and Sanitation (DWS) with regard to its water quality occurring in streams, dams, lakes, rivers, and estuaries. According to Le Roux (2003), every water management area will be identified as a 'Catchment Management Agency' (CMA). Three of these 19 recognised national water management areas are located in Gauteng; namely, . the

Olifants, the Crocodile (West)–Marico and the Upper Vaal (Fakir and Broomhall, 1999). The Hennops River only form a part of the many sub–catchments of the Crocodile (West)–Marico water management area. The Hennops River, together with others – for example, the Magalies, Crocodile, Blaaubank, and the lower Jukskei Rivers – drains into the Hartebeespoort Dam. The Dam’s outflow proceeds as the Crocodile River, which finally confluences with the Limpopo River.

### **3.3. Location and demarcation of the study area**

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The Hennops River catchment is located between Johannesburg and Tshwane, in the Gauteng province of South Africa. The Hennops River, and its main tributaries, flows in a northerly direction and cuts through the three large municipal jurisdictions within the province, that is, Ekurhuleni, the City of Johannesburg, and City of Tshwane. The catchment extends from Kempton Park in the south of Centurion, which is a suburb of Sunderland Ridge and Erasmia in the north. After passing Erasmia, the Hennops River flows through the Skurweberg range before joins with the Crocodile River, which drains into Hartebeespoort Dam, which is located in North–West Province.



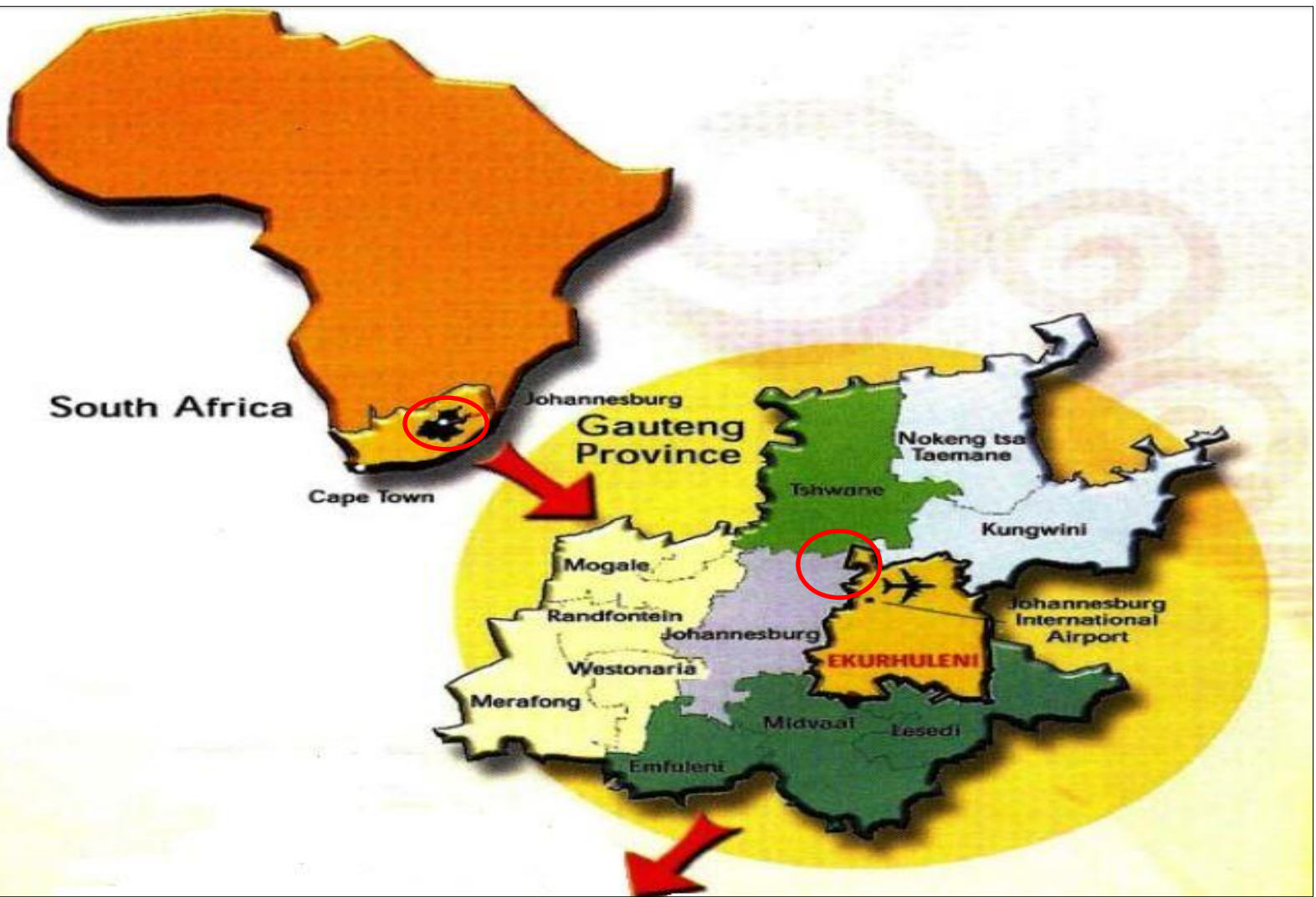


Figure 4: Location and demarcation of the study area (Bodenstein, J.A, Van Eeden, P.H, Legadima, J. and Chaka, J.; 2004)

The Hennops River originates as the Kaalspruit, which has its sources as natural springs in Norkem Park and Birchleigh North, which is south–east of Tembisa. This area is the upstream and the most southerly section of the study area. This research focuses on the residential property owners in the townships of Tembisa, Rabie Ridge and Ivory Park through which the Kaalspruit flows through in a northerly direction.

A number of complaints have been documented regarding the unacceptable levels of pollution in the Hennops River, Centurion Lake, and, subsequently, the Hartebeespoort Dam (Shepherd, 2000). At the upstream, residents of Tembisa, Rabie Ridge and Ivory Park have been attributed as contributing to the deteriorating water quality of the Hennops River (Hoffman 1995, Ryan, 2004). Researchers outline that, as the river flows through the three said townships; it receives heavy pollution due to some technically–related problems, such as: inadequate sanitation facilities, poor solid waste management, and inefficient storm water drainage (Hoffman, 1995; Shepherd, 2000). However, public attitudes towards various aspects of water resource protection are questionable, and hence need to be studied. The following sections describe the water resource policy context in the study area and across South Africa.

### **3.4. Overview of South Africa’s water situation**

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#### **3.4.1. Water availability**

South Africa is a semi–arid, water–stressed nation, with an average rainfall of roughly 450 mm, which is well below the world average rainfall of around 860 mm per year (CSIR, 2010). The availability of water across the nation is confronted with three major difficulties (DWAF, 2002):

- Overexploitation and pollution of its sources, its growing demand, unsustainable usage and wastage;
- The rainfall is seasonal and its distribution across the country is highly irregular (43% of the downpour falls on 13% of the area);
- Comparatively low stream flow in numerous rivers, which restrains the number of streams that can be depended upon for utilisation.

About 70% of South Africa's Gross Domestic Product (GDP) is upheld by water from the Inkomati, Pongola, Orange, and Limpopo Rivers, which, altogether, drain 66% of the land area (DWAF, 2000). The combined natural flow along South Africa's waterways adds up to 50 billion m<sup>3</sup> every year, on average, of which very nearly 10% begins in Lesotho (DWAF, 2000). Of the total runoff, just 14 billion m<sup>3</sup> is accessible for utilisation through dams, rivers, lakes, basin transfers and other water resource development across the nation (DWAF, 2000). Part of this runoff (known as the Ecological Reserve) must remain in the waterways in order to maintain the aquatic ecosystem and related biodiversity. The required amounts for this biological store differ from river to river and are reliant on the natural requirements to maintain the current ecological condition or future sought conditions of the catchment.

Prior to 1998, management of water resources was chiefly determined by demand, with emphasis on the development of new water resources because of the economic needs of the time (DWAF, 2000). The water resource management policy has a different emphasis, and the National Water (Act No 36 of 1998) is concerned with the following goals:

- Effectiveness and sustainability of water utilisation;

- Resolving the past uneven distribution of water as to ensure access to water for all South Africans, and;
- Reserving satisfactory water in all resources to maintain the aquatic ecosystems.

Ensuring the adequate water supply for current and future generations is not a unique case to South Africa. It is anticipated that by the year 2025, about 3,5 billion individuals (approximately half of the world's population) will face water shortages (WHO, 2010). In the context of South Africa, it is estimated that, taking into account current usage tendencies, demand for adequate water of useable quality will surpass availability by the year 2025 (DWAF, 2000). The proceeding pattern in industrialisation and urbanisation of the population is expected to place further weight on the already stressed nation's water resources, unless suitable remedial and protection actions are devised and executed.

Surface water resources remain the fundamental source of water supply in South Africa and are mainly used for the following five purposes (DWAF, 2002):

- Agriculture;
- Urban and rural utilisation;
- Mining and the industrial sector;
- Power generation;
- Forestation.

Farming watering system consumes nearly 60% of the total volume, followed by urban and rural utilisation at 25%. The remaining 15% being utilised by other four sectors (DWAF, 2000).



### **3.4.2. Water resource policy context of South Africa**

At the national level, three policies essentially influence the management of water resources in South Africa: The National Water Act (NWA), the National Water Resource Strategy (NWRS) and the National Environmental Management Act (NEMA). The NWA and NWRS are explicit about the need to protect the condition of water resources. At a national level, water resource relates to rainfall and runoff, aquatic environments – including dams, rivers, estuaries, wetlands and ground water. On a local level, the water resources include dams, rivers, small pockets of wetlands and groundwater (Gambiza and Palmer, 2004). Under the NWA, the guiding principles of a water resource management strategy are that all water utilisation must be sustainable, efficient and equitable (DWAF, 2005). These guiding principles recognise the need to protect the water resources for the benefit of humans, the economy and wildlife environments. Specifically, goals 7 and 8 of the National Water Act give adequate weight to surface water resources and aim to ensure the protection of such resources for sustainable utilisation and the benefit of ecosystem health.

As per the Constitutional mandate for water reform, the NWA (1998) recognises the Government, at national level, acting via the Minister of the DWS, as being accountable for the accomplishment of the fundamental principles of protection and sustainability. The National Government is the public trustee of the nation's water resources and has overall responsibility and authority, within the guiding framework of NWA and NWRS and within the broader framework of other environmental legislations, specifically the NEMA, over their protection, conservation, management and control, utilisation and development. The ultimate goal of water resource management is provided as the sustainable utilisation and protection of water resources for the benefit of all users.

The NWA provides some financial measures to support the setting up of water resource management services and the implementation of all efforts and strategies aimed at protection of water resources. The Minister of DWS is authorised to develop a pricing strategy: which may set separate charges based on geographic locations, classes of water users or individual water users. The pricing strategy and charges for water utilisation and violation charges are aimed at securing funding for water resource protection. Water utilisation and violation charges are further implemented as the enforcement of compliance with water management practices. This is attained through the establishment of incentives and dis-incentives, as indicated by the ‘user pays’ and ‘polluter pays’ principles for the purpose of encouraging effective use of water and minimise pollution.

In 1999, the Government of South Africa through the National Water Resource Strategy (1999) made a provision for 19 Water Management Areas (WMAs) and proposed the establishment of corresponding 19 Catchment Management Agencies (CMAs) to manage these areas. The establishment of CMAs, eventually put in place in all areas of water resource management, was focused on delegating the management of water resources to regional level and also to include local communities within the guiding framework of the NWRS. Under the NWA, in areas where no CMA is established or not operational, all powers and responsibilities of the CMA rest with the Minister of DWS, who is in charge of satisfying the CMA’s functions. In particular, the Regional Office of the DWS oversees water resources in their area of service until the CMAs are completely operational (Karar, 2003).

The establishment and function of water institutions further accommodated under the NWA are: Water User Associations, which are essential cooperative associations of individual water users that undertake water related activities for the purpose of their mutual benefits; and Advisory

Committees, providing advisory services to specific committees and international water management bodies. Chapter 13 of the Nation Water Act accommodates appointment, authorities and responsibilities of authorised personnel to have access to properties and perform inspections on the use of water and further manages the access and rights over land use in relation to servitudes.

The NWRS may be viewed as the execution strategy of the NWA, supported by other legislation, such as the National Environmental Management Act and Water Services Act (WSA), and provides information for water resource management and also the establishment of institutions. The NWRS gives the lawfully binding framework within which all water resources must be protected and controlled across South Africa. Another purpose of the NWRS includes giving the framework to the planning of Catchment Management Strategies for Water Management Areas.

### **3.5. History of nature conservation in South Africa**

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Traditionally, African people have been known for their high respect for natural resources. Traditional practices of conservation suggested that African practices in hunting, harvesting, agriculture, and forestry were planned in such a manner so as to conserve natural resources. Examples of this plan are the slashing and burning practices in which portions of land were harvested, slashed and burned for a specific period. Prior to the land becoming fertile, individuals in a neighbourhood would entirely leave a specific region and its soil to rest and recover and only return when the soil has completely recouped. Over time, this practice clearly became unsustainable and began to have a negative impact on the natural environment as land became scarce due to growth in the population.

Thonga fishermen located in Kosi Bay of northern Natal are another example of the history of conservation practices of South Africa. Fishing was done by means of a method of fishing kraals on the mouth of an estuary for over 700 years. Fish would swim in on the side of the rising flow and ultimately caught as the flow dropped. These traditional fishing kraals were designed in ways that took into account the sustainable catches that do not exhaust the fish population. Traditional practices of natural resource conservation are thus well known but not always documented well.

During the apartheid era, nature conservation was characterised by stringent environmental regulations, policies, physical patrols, and fences. Only white groups were aware of and could access these secured areas, which could not be reached by the remaining South African race groups. Apart from not benefiting as visitors/tourists in those secured areas, most of the African population groups were not included in decision-making and strategising related to the utilisation and distribution of natural resources and related services. Areas of nature conservation across the country developed to the detriment of local non-white communities. This system has resulted in the removal and exclusion of local communities from the benefits and management of nature conservation. According to De Beer and Marais (2005), this system led to local individuals feeling alienated and numerous people regarding the matter of nature conservation in a very negative light. A substantial number of people in South Africa came to see any matter related to the environmental with a very big concern and view them as white-only issues (Cock & Fig, 2001).

Largely, the aforementioned early nature conservation practice has over the years been criticised on various grounds (Fisher et al., 2005). These grounds include the fact that they were

- favouring Western views of nature;
- neglecting to take into account the land rights of other local communities;
- failing to consider the sophisticated natural resource management of indigenous people;
- and
- expelling individuals from various areas in an attempt to cause ecological simplification, but the outside pressure subsequently impinged on the very protected areas.

Fisher et al. (2005) demonstrated that in so many circumstances, the formation of protected areas neglected to take into account social costs, which include violations of human rights and the political and economic marginalisation of a huge number of local people. Numerous researchers have recognised that these early conservation practices influenced the way local people view and value the natural environment today. Local individuals were and frequently still are named as squatters and poachers rather than settlers and hunters (Brown, 1991; Colchester, 1994).

Generally, since the early 1970s in South Africa, particularly since the year 1994, the regulatory approaches of nature conservation were transformed to adopt a more democratic people-centred approach – that is a shift from the concept of nature conservation to a new methodology of natural resources management (De Beer & Marais, 2005). This methodology was neither new nor unique – perhaps simply because of the new democracy in South Africa, but it was relatively in accordance with global discussions around natural resource protection, eco-tourism, and eco-politics. The goal of this methodology was to embrace individuals as a major aspect of the natural environment and not as inactive observers. This approach sees environmental problems

as seriously political in the sense that it appreciates that they are rooted in resources and access to power in the public eye. This comprehensive methodology endeavours to secure endangered environments while at the same time discourage the advancement of ignored human rights. Regardless of these responsibilities to constructing sustainable societies and an embracing approach of human rights when setting out environmental issues, cooperative actions for the sake of environmentalism in South Africa are deficient. In South Africa, environmentalism is still enormously diverse and to a great degree still mirrors the social division of class, race, geographic location, land area, class, value and belief system, and gender (Cock & Fig, 2001).

### **3.6. Conclusion**

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This chapter discussed the study area in relation to the South Africa's catchment management areas as location and demarcations; as well as South Africa's water situation. The Hennops River forms a part of the many sub-catchments of the Crocodile (West)-Marico water management area and drains into the Hartebeespoort Dam, where its outflow continues as the Crocodile River, and finally confluences with the Limpopo River.

Located between Johannesburg and Tshwane, the Gauteng province of South Africa, the Hennops River; flows in a northerly direction and cuts through the three large municipal jurisdictions within the province in Ekurhuleni, Johannesburg, and Tshwane. South Africa's water situation has been discussed in terms of the water availability and water context of water policy with the country.

The following chapter will discuss the research design and method adopted for the purpose of addressing three research questions posed in this study: (a) What is the nature and extent of

residents' attitudes toward the protecting the condition of water resources? (b) What is the nature and extent of attitudes towards measures aimed at protection of water resources? (c) What environmental values underlie residents' attitudes towards water resource protection?

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## **CHAPTER 4: RESEARCH METHODS**

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### **4.1. Introduction**

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The previous chapter was a discussion of the study area. The purpose of this chapter is to present the approach utilised by this study to investigate residents' attitudes towards the protection of water resources. First, the survey design is outlined with a specific reference to structure of the questionnaire, types of question posed, scoring system as well as the administration method. Secondly, the sampling design is discussed, describing the survey sample, sampling design and the response rate. Third, the scoring system is outlined. Fourth, the chapter presents the method of data analysis employed in order to draw conclusions from a large body of quantitative data. Fifth, the overview of ethical consideration is briefly discussed. This chapter closes with a summary of significant points that have been discussed.

### **4.2. Survey design**

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A survey questionnaire was used to collect information from a random sample of residential property owners of the townships of Tembisa, Rabie Ridge and Ivory Park. The self-administered format of a questionnaire was adopted so as to minimise response bias attributed to administration by the researcher. This format was also more suitable for the nature of survey questions addressed by this research.

Written in English, the questionnaire was distributed to the survey population through the 'Drop Off/Pick Up' (DOPU) method. The following advantages associated with the DOPU method



influenced this choice over the traditional mailing systems. Firstly, there is a great potential for contact between the sampled respondent and the researcher. Face-to-face contact with potential respondents has the advantage of researchers having the capacity to clarify, personally, the reason for the study and the significance of participation. Also, the researcher has the capacity to determine if the individual meets the qualification necessities of the research (namely, ensuring that they are the owner of the property). Moreover, the difficulty of returning the survey to the researcher is lessened by the fact that the researcher physically collects the completed questionnaires.

A survey questionnaire composed of a variety of scale type questions (Likert-type) were systematically designed to capture residents' attitudes towards the protection of water resources. This comprised brief worded statements with five different response choices, extending from: 'strongly support' to 'strongly oppose'; 'strongly agree' to 'strongly disagree'; 'very important' to 'not important at all'; 'very willing' to 'not willing at all'; and, 'very concerned' to 'not concerned at all'. In order to minimise the load on potential respondents, through effort and time required to finish the survey questionnaire, close-ended questions were utilised and guidelines were made clear (Polit and Beck, 2010). A cover letter – which clarified the aim and objectives of the research study, voluntary participation and ensuring privacy of the responses – accompanied the survey questionnaire.

For the purpose of simplicity, the survey questionnaire was partitioned into five sections which were linked to the main research questions. The first section of the survey questionnaire employed the NEP scale to capture residents' endorsement of anthropocentric and ecocentric environmental values. Comprising fifteen statements, the NEP scale asked respondents to indicate the level of agreement or disagreement with every statement (Dunlap et al., 2000).

Questions in the second section gathered information about residents' concerns about the condition of water resources in the study area and the perceived importance for protecting water resources in general and also for which specific purposes, namely: drinking water quality; clean rivers and streams; flood control; wildlife habitat; public use; and enjoyment).

The remaining sections were an assortment of scale-type questions designed to measure the extent of: support for, or opposition to, various aspects of water resource protection; support for, or opposition to, different institutions that are involved in protection of water (levels of government, non-profit organisations, community based organisations and profitable organisations); support for, or opposition to, specific water resource protection policy tools (regulations, restrictions, economic incentives, etc.); and, support for, or opposition to, various funding mechanisms, as well as expressed willingness to contribute financially to aspects of water resource protection – in that the polluter pays principle, municipal rates, taxes, etc. In addition, support for or opposition to regulations was measured in relation to types of land utilisation: for example, restricting the construction of certain structures and cutting down of trees and the removal of vegetation to areas near water resources.

Finally, one optional and open-ended question was asked to conclude the questionnaire, which basically asked for respondents to explain their support for or opposition to Government efforts aimed at protecting the state of water resources – for example, streams, rivers, lakes and wetlands – and/or note their views on specific water resource policies and programmes in their area. For this part, additional space was provided on the back of the questionnaire and respondents were asked to attach a separate sheet if the created space was insufficient.

### 4.3. Sampling design

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Based on the criteria of proximity to water resources, this research incorporated three populations along the upper Hennops River catchment: (1) Tembisa; (2) Rabie Ridge; and (3) Ivory Park. The literature suggests that attitudes may vary by jurisdiction, thus the random sample was stratified to reach residents in two jurisdictional categories: Ekurhuleni and City of Johannesburg. A statistic-based sampling frame for all three townships in the study area was sought.

A primary source of sampling frames for this research was the municipal ward counsellors. The names and address lists provided by ward counsellors for the study area included: residential property owners, whose details were obtained through the Reconstruction and Development Programme (RDP); business property owners; and vacant land owners. Given this list of different property owners, the population of interest for the random sample was limited to residential property owners only.

The water resource and related policy framework in the study area justify this approach. Specifically, property owners are more directly affected by land use regulations and planning efforts, and, are thus worthy of interest. Research on how water resource protection policies affect property values (Clark, 2001) highlights the need to better understand landowners' attitudes about these issues. South Africa, in particular, affords special attention to property owners by requiring that all potentially affected property owners be notified when making land use decisions (DWA, 1998).

### 4.3.1. Survey sample and sample sizes

The random sampling technique was employed in order to reach a larger sample of individuals who reside in each jurisdictional area. Approximately 266 completed surveys were needed to achieve a ninety–five percent confidence interval and accepting a five percent sampling error (Salant and Dillman 1994; Dillman 2000). This percentage population method was used in every township to determine the total number of surveys required from each. The percentage population sizes of the three townships versus the entire study population are as follows: the township of Tembisa is the largest with population adding up to 67%; followed by Ivory Park at 27%; and the smallest being Rabie Ridge, with only 6% of the study population. In this regard, 177 completed questionnaires were required from Tembisa, 73 from Ivory Park and only 16 from Rabie Ridge (see table below).

<b>Sample</b>	<b>Size of sampling frame (before sorting)</b>	<b>% sampling frame size (before sorting)</b>	<b>Starting sample size</b>	<b>Required Sample size</b>
Rabie Ridge	15,220	6	20	16
Ivory Park	68,299	27	86	73
Tembisa	166,230	67	208	177
<b>Total</b>	<b>249,749</b>	<b>100</b>	<b>314</b>	<b>266</b>

*Table 1: Sampling requirements*

At the stratum level, a higher sampling error, between five and ten percent, is accepted (Bunns and Grove, 2009). Assuming that ninety–five percent of addresses would be deliverable, ninety percent of surveys would be collected/returned, and 100% of the collected/returned surveys would be checked for completeness; approximately 314 names were randomly drawn – which amounts to about 20 names from Rabie Ridge, 86 names from Ivory Park and 208 from Tembisa.

The random sample was drawn from the list obtained from the municipal ward counsellors. Since this research is concerned with residents' attitudes; public property owners, owners of commercial and industrial properties, and owners of the RDP houses were omitted from the sampling frame. Moreover, the population of interest is those residents who own property and live within the catchment, thus vacant land was omitted from the sampling frame. Absentee property owners were also eliminated from the sample. The name lists obtained from ward counsellors were also sorted to remove duplicate entries for people who own more than one property in the study area. The random sample was drawn from the remaining property owners who live in the three townships on land zoned residential properties.

#### **4.3.2. Response rate**

Given the wide agreement that a high response rate is valuable for the research of this nature, scientists sometimes battle to achieve this. The two main reasons behind non-responses are: the inability to deliver the surveys to the targeted population (e.g. absenteeism and wrong addresses); and the hesitance and unwillingness of individuals to respond (Baruch, 1999).

Comprehensive preparation – for example, getting updated addresses or guaranteeing participation when personally circulating them – will considerably lessen the prospect of non-response, although barely eliminate it totally. For the purpose of this research, the Drop Off/Pick Up dissemination strategy for survey questionnaires was utilised. This strategy, most of the time, gets a high response rate than the traditional mail survey distribution, and presents the chance for individual interaction. Respondents may feel more obliged to fill in the survey if a positive interaction happens with the researcher.

Overall, a ninety–three percent rate of response was attained for the delivered survey questionnaire, with a total of 276 completed surveys returned, see table 2 below. Not surprisingly, the largest response rate (100%) was obtained from the Rabie Ridge sample frame since the sample area is dominated by professionals. The response rate for both Ivory Park and Tembisa were 94% and 84%, respectively. Of the combined 22% unreturned surveys from both Ivory park and Tembisa, 7% of the property owners were absent, even after the second collection attempt was made, and the remaining 15% refused to participate in the study.

<b>Sample</b>	<b>Total delivered</b>	<b>Total unreturned</b>	<b>Total returned</b>	<b>% Response rate</b>	<b>Final sample size target</b>
Rabie Ridge	20	0	20	100	16
Ivory Park	86	5	81	94	73
Tembisa	208	33	175	84	177
<b>Total</b>	<b>314</b>	<b>100</b>	<b>276</b>	<b>93</b>	<b>266</b>

*Table 2: Delivered questionnaires vs returned*

Feedback from the survey participants who declined to complete the survey suggests that some people lacked the knowledge about the subject of study and even experienced difficulty in completing the survey. Finally, the difficulty of the survey relates to both the complex nature of the topic as well as to the question format, both of which were addressed in the survey design stage and, to some extent, could not be avoided.

#### **4.4. Questionnaire scoring system**

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The questionnaire was composed of short statements comprising five different response choices extending from: ‘strongly support’ to ‘strongly oppose’; ‘strongly agree’ to ‘strongly disagree’;

‘very important’ to ‘not important at all’; ‘very willing’ to ‘not willing at all’; and, ‘very concerned’ to ‘not concerned at all’.

A scoring system (Likert-type) was employed to capture residents’ reactions to all attitudinal questions about the protection of water resources. The mean scores were determined utilising the central tendency of the sample, while the frequency analyses were determined by means of item response distribution. In order to establish the nature and extent of residents’ attitudes; an index, presenting the overall orientation, was calculated by averaging the mean of the scores of the scale items. The composite mean score had a possible range of 1.0 to 5.0, where 1.0 represents the weakest interest, while 5.0 indicates the strongest position for being good, concerned, support and important of the issue. The frequency distribution is based on the percentage of sample population.

In order to establish what environmental values form the basis of residents’ attitudes towards protection of water resources, the NEP scale was employed. This was determined by providing the percentage and mean distributions of the sample’s NEP scale of fifteen items (table 3). The NEP scale is a scoring system in which the magnitude of the score demonstrates the endorsement of either ecocentrism or anthropocentrism. The eight (odd numbered and green coded items in table 3) of the items in the scale are intended to measure the endorsement of ecocentrism, and are structured such that the agreement mirrors the acceptance thereof, namely the rejection of anthropocentrism. In the same way, lack of agreement will reflect the acceptance of the anthropocentrism (rejection of the ecocentrism). Inversely, the other seven (even numbered and yellow coded items – see table 1) aim to quantify the endorsement of anthropocentrism by the sample population and are organised such that the agreement mirrors the acceptance (rejection of

ecocentrism). By the same token, disagreeing with these items will purely reflect the acceptance of the ecocentrism (rejection of anthropocentrism).

Respondents were given the following options for response to items: five (5) points for 'strongly agree'; four (4) for 'agree'; three (3) for 'unsure'; two (2) points for 'disagree'; and one (1) point for 'strongly disagree'.

For the purpose of this research, scores assigned to the seven Dominant Social Paradigm (DSP) items were reversed in order to standardise the scoring system with that of the NEP worldview. For this reason, respondents were given: one (1) point for 'strongly agree'; two for 'agree'; three for 'unsure'; four (4) for 'disagree'; and five for 'strongly disagree'. Along these lines, the composite mean score had a possible range of 1.0 to 5.0. Because the directionality of the item scores had been standardised, the mean score of 1.0 represents the strongest endorsement of the anthropocentrism while 5.0 indicates the strongest acceptance of ecocentrism.

In order to enhance the understanding of mean scores of item sample, directionality of some items was changed utilising the following formula:

Reversed score:  $(Z) = \max(Z) + 1 - Z$ ,

Where  $\max(Z)$  = Maximum possible value for Z.

In this case,  $\max(Z)$  is 5 since the Likert scale can go only up to 5. In this manner, all means will have a tendency towards 5.

Quantitative data analysis will be described further in the following chapters and generalisation will be made to the entire population of the townships of Tembisa, Rabie Ridge and Ivory Park as is common in quantitative research (Bryman, 2004).



#### 4.5. Data analyses

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The statistically based treatment of the gathered data was performed utilising the Microsoft Excel application, a computer based software mainly used for statistical data analyses. As a spread-sheet, Excel can be utilised for data entry, manipulation and presentation of results. It also offers a suite of statistical analyses functions and different tools that can be utilised to run a descriptive statistics and to perform a diversity of inferential statistical tests that are broadly utilised as part of social research. Moreover, it gives all standard useful spread-sheet functions, which makes it very helpful for different analyses and information manipulation assignments, including the incorporation of tables and producing graphical and other presentation configurations (Rose et al, 2014).

Analyses of the collected data were carried out using numbers so the response to every question of the survey questionnaire was coded using numbers on a scale of 1 to 5. The computer software described the data utilising frequency and central tendency, as laid out by Parahoo (2006). The frequency of a specific response to a survey question was computed as a percentage and the data was presented utilising tables and bar charts. As indicated by Parahoo (2006), tables facilitate presentation of large information and diagrams give an explicit picture of results with a sense of proportion. The central tendency was computed by calculating the mean response and the normal distribution around the mean. As recommended by Cormack (1991) the relevance and format of the tables and charts produced by computer analyses were thoroughly checked and presented in a possible simplest manner.

#### **4.6. Ethical consideration**

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The study ensured that all undertakings are conducted in an ethically sound manner, from the study design to reporting of the final results. Apart from researcher's explanation, the cover page of the questionnaire stated clearly that individuals have rights to choose whether or not they get involved in this study. Informed consent was sought from potential participants. Before the consent was sought the researcher provided details of the nature and purpose of the study, what is expected from participants, who will have access to the data and the possible outcomes of the study. In this regard, completion of the questionnaire by participants was considered as giving consent to participate in the study. Participants were given satisfactory time to consider their participation. To ensure the anonymity and confidentiality of respondents, no names were written on the survey questionnaires. In addition, the questionnaire cover page contained a written guarantee to the participants that the data collected will remain confidential and that only the researcher will have access to it.

#### **4.7. Conclusion**

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This chapter outlined the research methods of this study. Particularly, it discussed the survey design in relation to the format and organisation of the survey questionnaire; the types of questions used; as well as the adopted method of distribution and collection of the questionnaires to and from the sample population. The chapter also detailed the sampling design, focusing on the selection of the survey sample along with relevant inclusions and exclusions, which required sample size as well as the questionnaire response rate. The chapter closes with the presentation of the method of data analysis employed in order to draw significant results from a large body of quantitative data. The following chapter presents the findings of the research in relation to the

theoretical context of the study as reviewed in chapter 2. This discussion is specifically presented in line with the three central questions posed of this study.

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## **CHAPTER 5: RESEARCH FINDINGS**

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### **5.1. Introduction**

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The previous chapter was a discussion of the research methods. Organised in four sections, this chapter presents the results of this research in line with the three central questions. First, results – on the nature and extent of residents’ attitudes towards the protection of the conditions of water resources – are presented in form of descriptive statistics and ranking of responses to question items, representing different dimensions of attitudes towards water resource protection. Secondly, results on the nature and extent of attitudes towards measures aimed at protection of water resources are described. The rankings of question items are summarised for the purpose of understanding which water resource protection efforts are greatly supported and which opposed by residents in the study area. Third, the environmental values underlying residents’ attitudes towards water resource protection are discussed. More specifically, a description of how scores from individual question items were consolidated and grouped into categories that represent the endorsement of either ecocentrism or anthropocentrism are presented. The fourth section concludes this chapter with a summary of the important points.

### **5.2. Research question # 1: What is the nature and extent of residents’ attitudes toward protecting the condition of water resources?**

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This section addresses the first research question. The overall findings of the survey demonstrate favourable attitudes among residents in the townships of Tembisa, Rabie Ridge and Ivory Park. This is confirmed by the vast majority of survey respondents showing a substantial interest in protecting the conditions of water, both in general and also for a particular purpose.

The nature and extent of residents' attitudes, largely, is understood easily by ranking the designed individual question items that represent diverse aspects of the protection of water resources and related attitudinal dimensions. Therefore, in the survey questionnaire, the broader aspect of attitudes towards protecting the conditions of water resources comprised two questions: the first question asked residents to rate their perceived importance for protecting water resources in general; while the second asked them to rate their perceived importance for protecting water resources for a specific purpose/use.

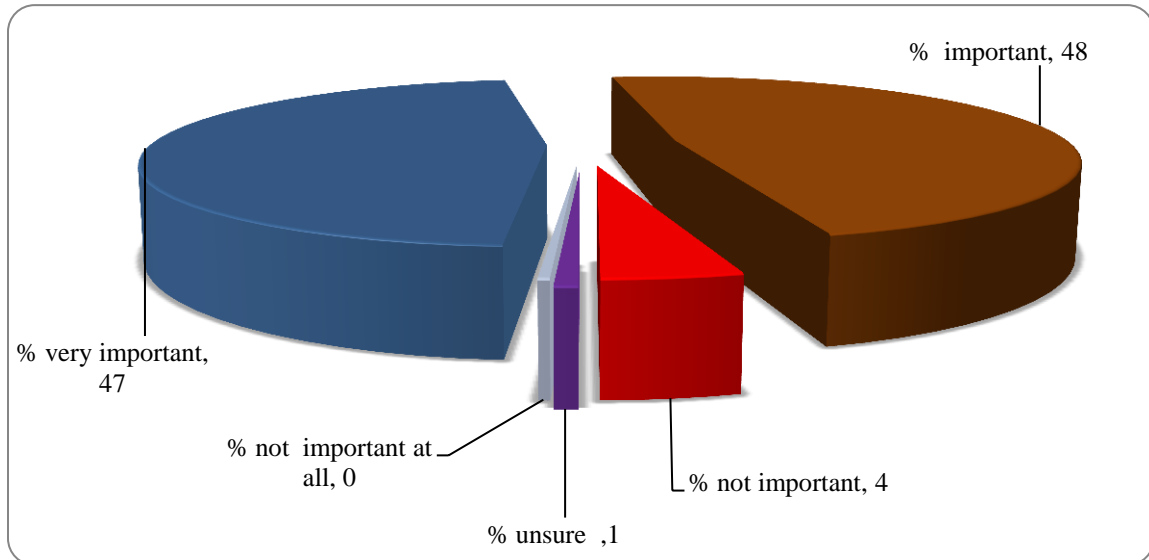
Many scientists have demonstrated some kind of a linear relationship between environmental perception and environmental attitudes. In this regard, residents who perceive the protection of water resources as important possess favourable attitudes. On the other hand, those who perceive the protection of water resources as not important possess unfavourable attitudes; and residents with indecisive views are regarded as having neutral attitudes.

The following two sections present the findings of the first research question and are concerned with the perceived importance for protecting water resources in general and also for a particular purpose.

### **5.2.1. Attitudes towards the condition of water resources based on perceived importance of protection in general**

Investigation of this attitudinal aspect demonstrates that residents in the study area embrace the perception that it is generally important to protect water resources. The vast majority of survey respondents expressed agreement with the view of protecting water resources in general. The results are graphically represented in figure 5 below. These findings suggest that residents in the upper Hennops River catchment hold favourable

attitudes towards the protection of water resources. Generally, with this kind of attitude, such residents are more probable to protect the conditions of water resources.



**Figure 5: Importance of protecting water resources in general**

The great majority (95%) of the survey respondents expressed agreement with idea that it is important to protect water resources in general. A good amount (47%) rated protection ‘very important’; and by nearly the same quota (48%) of the respondents rated it just being ‘important’. This implies that the majority of residents within the study area accept the idea that it is generally important to protect water resources. Some insignificant amount (4%) of the respondents agreed with the opinion that it is not important to protect water resources for general utilisation. Only 1% of the residents had indecisive views in this regard.

### **5.2.2. Attitudes towards the condition of water resources based on perceived importance of protection for a specific purpose**

In light of the importance of protecting the conditions of water resources for a specific purpose, findings revealed that residents in the study area hold a view that it is essential to protect water resources for the five identified major purposes. A very good number of survey respondents perceived the protection of water resources to be important for the following specific purposes: (a) drinking water quality; (b) wildlife habitat; (c) clean rivers and streams; (d) flood control; and (e) public use and enjoyment. The findings are presented in figure 6 below. These findings reflect the favourable attitudes towards the protection of water resources among residents of the townships of Tembisa, Rabie Ridge and Ivory Park.

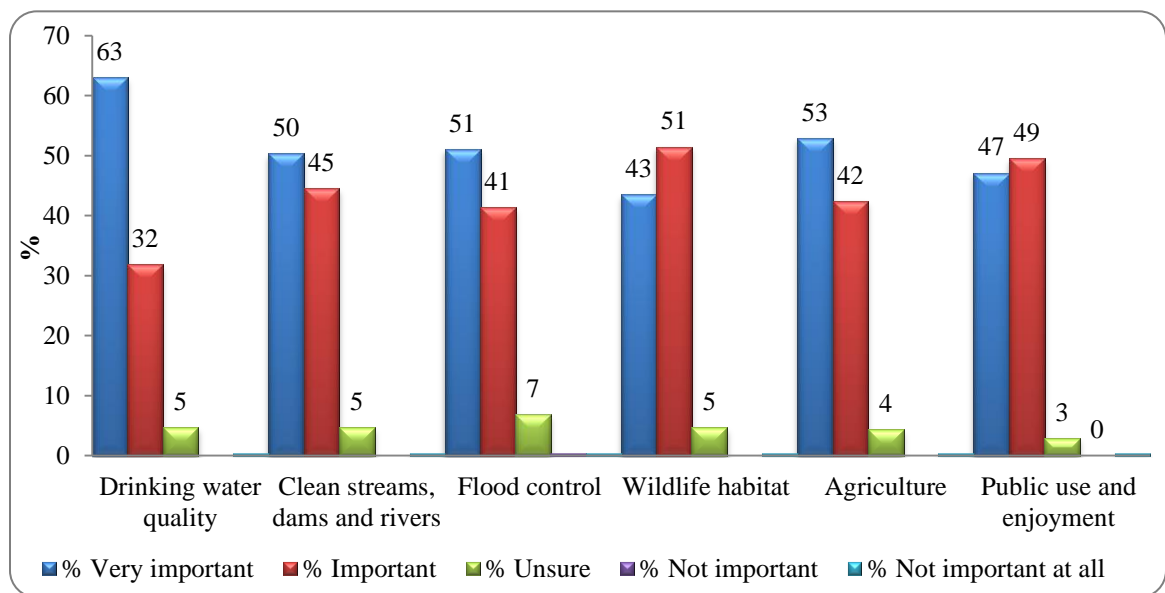


Figure 6: The importance of protecting the condition of water resources for specific purpose

On average, the vast majority (93%) of the survey respondents embrace the view that it is ‘important’ to protect the conditions of water resources for the identified purposes. Over half (51%) of the sample population feel that it is ‘very important’, while 44% hold the view that it is just ‘important’ to protect water resources. A very negligible amount of respondents (<1%) accept the idea that it is ‘not important’ to protect the conditions of

water resources for any of the purposes; and only 3% had irresolute views about the protection of such natural resources. The perceived importance for protection of water resources for the identified specific purposes can be summarised as follows:

- Drinking water purpose : 95%;
- Clean stream, dams and rivers : 95%;
- Flood control : 92%;
- Wildlife habitat : 94%;
- Public use and enjoyment : 87%.

Drinking water quality, agriculture and clean streams and rivers have the greatest support, followed by flood control and recreation purposes. These opinions suggest that residents hold favourable attitudes towards the protection of water resources – not only for their own benefit, but also for the benefit and wellbeing of wildlife ecosystem and related aquatic biodiversity.

### **5.3. Research question # 2: What is the nature and extent of attitudes towards measures aimed at the protection of water resources?**

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This section addresses the second question of this research. Largely, the study findings established that residents within the study area hold favourable attitudes towards the protection of water resources. This is evident by the significant support for measures aimed at water resource protection among residents, though some level of opposition exists for particular resource protection measures.

Emphasis is put here on assessing the nature and extent of residents' support or opposition toward measures aimed at water resource protection. In order to address this second research



question, the following specific attitudinal aspects of water resource protection were evaluated in this research:

- (a) Support for or opposition to different organisations that undertake water resource protection measures, including different levels of government, non-profit organisations, business for profit and community based organisations;
- (b) Support for or opposition to specific water resource protection policy tools with a specific focus on regulations that are applied to various land types (i.e., residential, commercial) and particular land use restriction types – such as the removal of vegetation and prevention of certain development near water resources;
- (c) Support for or opposition to different economic measures for protecting water resources in relation to the expressed willingness to contribute financially towards protecting water resources and also supporting or opposing specific funding mechanisms (e.g. sewage charges, taxes, etc).

In the analyses and demonstration to follow, all attitudinal questions were asked in association with protection of water resources– for example, rivers, streams, wetlands, lakes and dams – in the upper Hennops River catchment.

### **5.3.1. Attitudes towards protection measures based on support for or opposition to different institutions that undertake water resource protection**

Examination of this aspect of attitude reveals that residents do greatly support organisations that undertake water resource protection within the area of study. A remarkable number of survey respondents demonstrated impressive support of the

organisations – such as the national government, local government, private business, non-profit and community based organisations. This substantial support denotes that residents in the study area embrace the favourable attitudes towards the protection of water resources.

Various agencies such as different levels of government and community based organisations play a vital role in carrying out the efforts and strategies that are necessary for the successful protection of water resources. In this regard, findings of this study suggest that residents who are supportive of these agencies are more probable to comply with the established policy measures towards water resource protection.

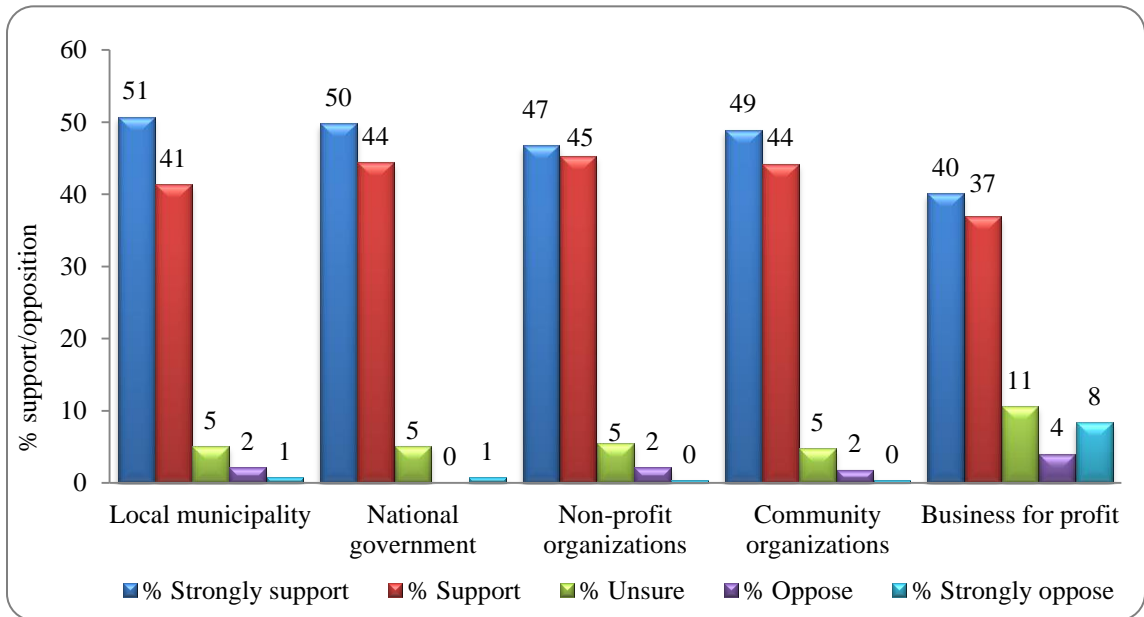


Figure 7: Support for or opposition to different institutions involved in protecting water resources

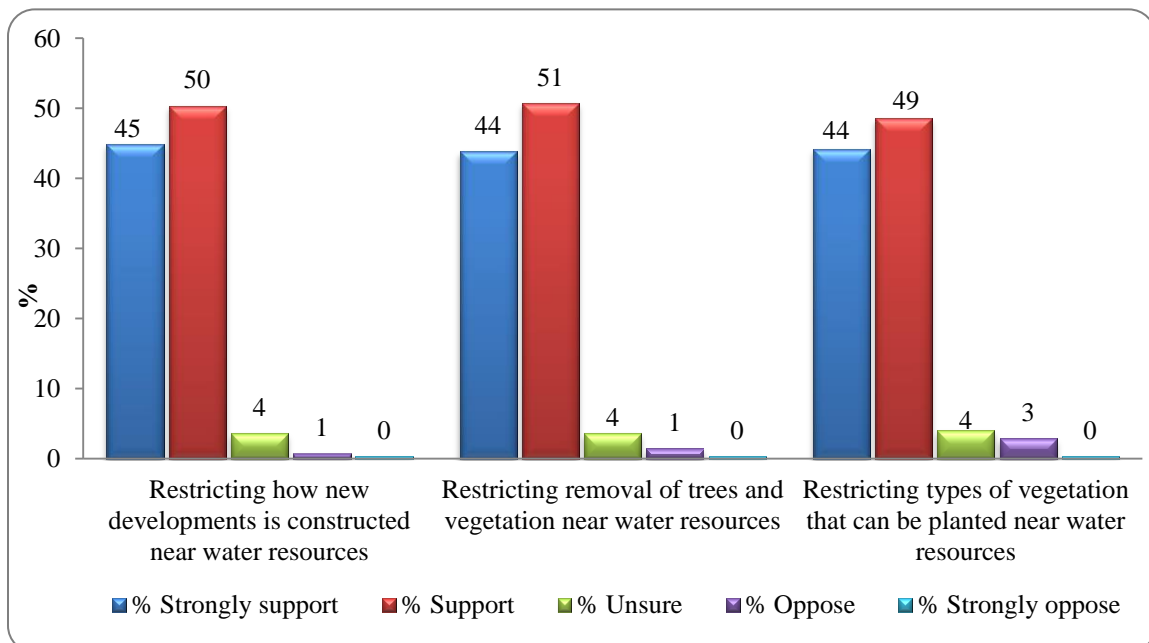
As presented in the figure 7 above, the national government and community-based organisations are most preferred with 94% and 93% of residents’ support, respectively. This is followed by local government and non-profit organisations, with 92% of support each by residents within the study area. Efforts by the organisations that

generate profit are the most opposed (8%), which may be because of doubt or other negative perspectives about business undertaking efforts towards water protection.

### 5.3.2. Attitudes towards protection measures based on support for or opposition to specific water resource protection policy tools

The overall investigation of this attitudinal dimension demonstrates substantial residents' support for protection policy tools. The vast majority of the survey respondents exhibited adequate support of land use regulations and related restriction measures near water resources.

This finding suggests that residents in the upper Hennops River catchment possess favourable attitudes towards the protection of water resources. Residents' expressions of favourable attitudes towards policy tools, in general, are not surprising, since evidence within the study area demonstrates widespread support for environmental protection in general.



*Figure 8: Support for or opposition to specific water resource protection policy tools*

Considerable support (95%) was expressed by survey respondents for regulations applied to developments near water resources. Also, restriction on the removal of trees and associated vegetation alongside the water resources has received the equivalent extent of support (95%) from respondents. This vast support demonstrates the endorsement of ecocentric values by residents in the study area: that is, the protection of water resources not only for human benefit, but also for the benefit of wildlife and associated aquatic biodiversity. In terms of regulating the type of trees and vegetation that can be grown near water resources, 93% of the residents are in support of this policy tool.

Water resource protection is one capital branch of water management, which is sustained by the availability of adequate funding and the sustainable funding mechanisms. Generally, residents are expected to contribute financially towards the protection of water resources. The following section focuses on the extent of support of or opposition to economic protection measures, including various funding mechanisms.

### **5.3.3. Attitudes towards protection measures based on support for or opposition to various funding mechanisms**

With regard to the economic measures aimed at the protection of water resources, the vast majority of residents (47%) within the study area express some significant opposition. This is evident by the large number of survey respondents who demonstrated their opposition towards the various funding mechanisms. This opposition is a direct reflection of the residents' unfavourable attitude towards any economic means of water resource protection. The economic/financial support was measured in terms of expressed

willingness to personally pay for measures aimed at protecting water resources. The findings provide clear evidence that most residents are resistant to economic efforts and do not support the idea of personally paying for water resource protection.

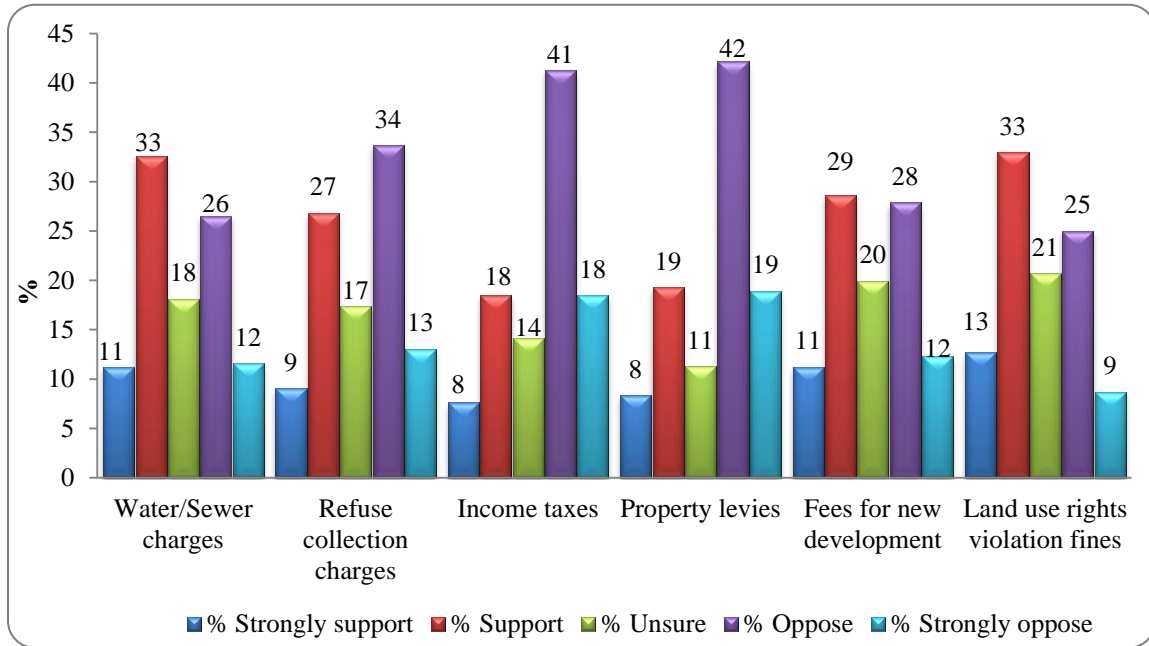


Figure 9: Support for or opposition to various funding mechanisms

From figure 9, predictable patterns can be observed in the extent of support and opposition towards various funding mechanisms that are employed to protect the conditions of water resources within the area of study. The funding mechanism that received support involves the particular case that obliges the party responsible for degradation of water resources to pay a fine. A good number (46%) of the survey respondent exhibited support for responsible parties to pay fines on the violations of land use.

Opposition to charges on water/sewer bills (38%) and refuse collection bills (47%) was significant, with over one-third (43%) of respondents, on average, opposing these funding methods.

While support and opposition on fees for new development is almost in equilibrium (40%), the vast majority of respondents expressed opposition to funding water resource protection through property levies (71%). The survey findings also highlighted the anti-tax sentiment in the study area, as over half (59%) of respondents opposed the use of income taxes for the protection of resources, and only 20% of the sample population is in support of the funding mechanism through income taxes.

Moreover, it is worthy to note that, on average, the opposed funding mechanisms are ones that affect residents financially (paying personally), which further indicates that it is likely that self interest is also at play in this matter.

Further investigation of this aspect demonstrates that several respondents (14% on average) had an indecisive view with regard to all funding mechanisms aimed at the protection of water resources. This finding suggests that residents in the study area may be lacking understanding of this funding mechanism and how they relate to water resource protection, so the communication of additional details may be essential for residents to express informed viewpoints. In summary, the survey residents are highly resistant to financial measures aimed at water resource protection, which may be linked to the endorsement of anthropocentric world view (values) – not having any desire to spend their personal cash to contribute towards the protection of the natural environment.

More investigation on values that underlie residents' attitudes towards the protection of water resources is presented below.

#### **5.4. Research question # 3: What environmental values underlie residents' attitudes towards water resource protection?**

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This section addresses the third question of the research. The NEP scale has been utilised in the survey questionnaire to determine residents' environmental values underlying attitudes towards protection of water resources. Mainly, the NEP scale attempts to determine the way in which residents comprehend the natural environment as well as the way residents view their association with it.

Largely, the findings demonstrate that residents' attitudes towards protection of water resources are governed by ecocentric environmental values. This was established from the finding that the vast majority of survey respondents expressed agreement with the ecocentric statements of the survey questionnaire (NEP scale). Ecocentric individuals value natural resources for their own specific purpose. In this regard, these residents tend to support the protection of water resources, not only for human benefit, but also for the wellbeing and benefit of wildlife and associated aquatic biodiversity. The ecocentrism value was further certified by large amount of survey respondents who demonstrated the importance of protecting water resources for the purpose of clean rivers and streams, flood control and wildlife habitat.

Item	Description	Percentage distribution										Mean
		5	1*	4	2*	3	3*	1	4*	1	5*	
		% Strongly agree		% Agree		% Unsure		% Disagree		% Strongly disagree		
1	We are approaching the limit of the number of people the earth can support	33		42		11		9		4		3.9
2	Humans have the right to modify the natural environment to suit their needs	6		20		9		38		27		3.6
3	When humans interfere with nature, it often produces disastrous consequences	37		51		5		6		1		4.2
4	Human ingenuity will ensure that we does not make the earth unliveable	22		39		4		22		12		2.6
5	Humans are severely abusing the environment	34		53		5		6		2		4.1
6	The earth has plenty of natural resources if we just learn how to develop them	13		46		5		22		13		2.8
7	Plants and animals have as much right as humans to exist	14		27		7		36		17		2.9
8	The balance of nature is strong enough to cope with the impact of modern industries	10		13		7		37		33		3.7
9	Despite our special abilities, humans are still subject to the laws of nature	34		50		6		8		3		4.0
10	The so-called 'ecological crisis' facing humankind has been greatly exaggerated	17		32		12		30		10		2.8
11	The earth is like a spaceship with very limited room and resources	36		46		4		12		2		4.0
12	Humans were meant to rule over the rest of nature	11		17		7		47		17		3.4
13	The balance of nature is very delicate and easily upset	30		53		8		7		2		4.0
14	Humans will eventually learn enough about how nature works to be able to control it	23		41		8		20		8		2.5
15	If things continue on their present course, we will soon experience a major ecological catastrophe	46		46		4		3		0		4.3
<b>Mean</b>											<b>3.5</b>	
<b>Average</b>		<b>33</b>		<b>46</b>		<b>6</b>		<b>11</b>		<b>4</b>		<b>3.9</b>
<b>Average</b>		<b>15</b>		<b>30</b>		<b>8</b>		<b>31</b>		<b>17</b>		<b>3.1</b>

\* Reverse scale for odd numbered and yellow coded items.

Table 3: The NEP scale results



Based on the study findings, the mean score for 15 NEP scale items was found to be 3.5. This is after the revision of the directionality of item scores: that is, all scores of ecocentric views are represented as higher numbers (score 5 for pro-NEP to score 1 for anti-NEP). The mean score of 3.5 indicates that the general orientation of a study sample fits to the high rank of the ecocentrism.

From the above table, it is also noted that the mean scores for eight even-numbered ecocentric items (green-coded) range from 2.9 to 4.3, whereas the mean scores for other seven odd numbered anthropocentric items (yellow-coded) range from 3.5 to 3.7.

The frequency distributions on the ecocentric items (table 3) demonstrate that over three quarters of the sample population (79%) agreed with these statements, just 6% were undecided, whereas 15% were in disagreement with the statements. On the other hand, frequency distributions on the anthropocentric items (figure 10) demonstrated that 44% of the sample population agreed with the statements, while the majority (48%) disagreed. The undecided portion of the sample population was found to be low at 8%.

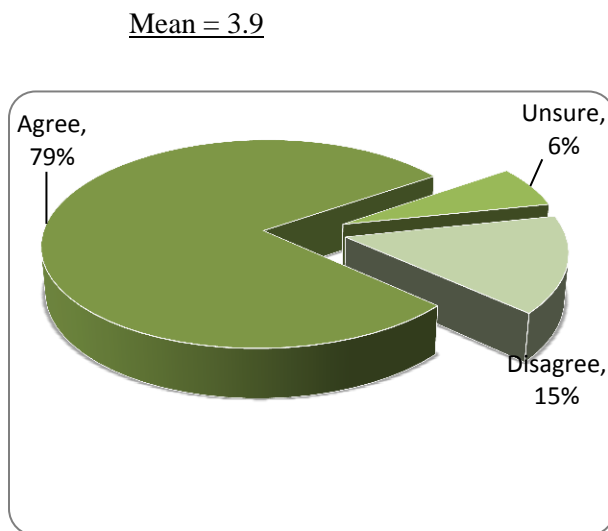


Figure 11: Frequency and mean distribution – Ecocentrism

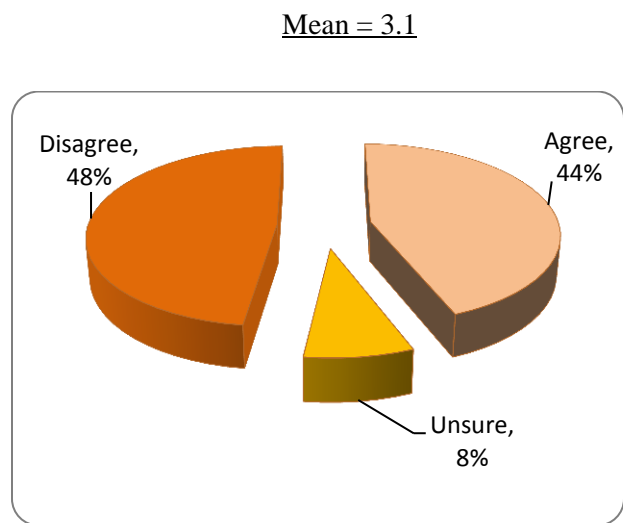


Figure 10: Frequency and mean distribution – Anthropocentrism

Examination of the overall frequency and mean distributions, Figures 10 and 11 above demonstrate that residents' attitudes (vast majority) towards water resource protection are underpinned by the ecocentric environmental values. This finding is not surprising given the residents' great support to protect water resources for the purpose of wildlife habitat as well as clean streams, rivers, dams and lakes. This is graphically represented by an overall agreement and mean of 79% and 3.9, respectively, on the ecocentric statement (figure 11). Moreover, a 48% disagreement (majority) and a mean of 3.1 on anthropocentric statements (figure 10) further confirm this finding.

Detailed findings on all statements are presented below by categorising the fifteen statements of the NEP scale into three items per group in order to produce five central aspects of this scale:

- (a) Limit to growth: anti-anthropocentrism;
- (b) Balance of nature: anti-ecocentrism;
- (c) Eco-crisis possibility.

#### **5.4.1. Limit to growth (NEP scale – items 1, 6 and 11)**

Four decades ago, a ferocious debate erupted when a significant number of individuals argued that economic and population growth was resulting in the decline of the natural environment, and could not be sustained forever. Numerous books and articles on this subject unleashed a wave of discussion around the limitations of growth on Mother Earth (Forrester, 1971, Meadow et al, 1972). In its simplest form, 'limit-to-growth' is about how the world and its resources have constraints to how big the world population can get. By the use of three statements (items 1, 6 and 11), the NEP scale used in this research

aimed to capture the respondents' beliefs about the carrying the capacity of the earth and the availability of resources.

Investigation of this aspect reveals that three quarters (75%) of the sample population embrace a belief about the control of population size on earth (item 1): strongly rating 33% and mildly 42%, with 13% opposing the belief and 12% having indecisive views. In connection to the limits of human interruption to Mother Nature (item 11), more than three quarters of the sample population (82%) held pro-NEP worldviews: with 36% rating it strongly, 46% mildly, 14% disagreeing and only 4% had indecisive views. However, the majority of the sample population (59%) accepted the anthropocentric worldview about the unlimited natural resources on earth and the importance of learning to develop them (item-6), while 35% disagreed and 5% had irresolute views.

#### **5.4.2. Anti-anthropocentrism (NEP scale - items 2, 7 and 12)**

Anti-anthropocentrism can be well understood by first defining anthropocentrism, which can be related to some sort of human prejudice. Generally, it is fundamentally the belief that humans are, for some reason, better or above all other species.

An anti-anthropocentric belief system would be one that rejects that belief system and the presumption that humans are, for some reason, more worthy of anything than another species. With the end goal of capturing the beliefs of the sample population in this regard, the NEP scale takes into account the three associated items (i.e. 2, 7 and 12).

Ecocentrism does not acknowledge the view that the natural environment exists fundamentally for human utilisation and does not have any essential value of its own existence (item 12), and also that people have the right to adjust nature in order to suit their own particular requirements for survival (item 2). More than two thirds (65%) of the sample population demonstrated the endorsement of the idea that nature has its own intrinsic value to exist and that humans do not possess any rights to adjust the natural environment to suit their own particular needs: 27% believed this strongly, 38% mildly opposed the anthropocentric motive that has been posed by item 2, with a quarter (26%) agreeing and 9% of the sample population having indecisive views.

In relation to item 12, more than half of the sample population (64%) holds ecocentric views, while over a quarter (28%) hold anthropocentric views and only 7% have irresolute views. Over a half (53%) of the sample population supports the ecocentric idea associated with the right and value of the existence of plants and animals being much the same as that of humans (item 7). 43% contradicted this, while only 7% held indecisive views.

#### **5.4.3. The balance of nature (NEP scale - items 3, 8 and 13)**

Given the fact that equilibrium is a key to all forms of lives; the balance of nature, or ecological equalisation, is a steady condition in which natural groups and groups of animals and plants exist; sustained by adaptation, competition, and other connections between members of such groups and their non-living surroundings. Even though some environmentalist organisations contend that humans' actions

are not compatible with the balanced ecological systems, there are various illustrations in past history presenting that many modern day-to-day habitats originally come from human actions or activities

However, from the sample population, the combination of three statements (3, 8 and 13) of the NEP grasps the thought that the parity of nature is very fragile and can be effectively upset by human obstruction. Regarding item 3, which set forward that human interference in nature regularly delivers awful outcomes, 85% of the example populace concurred, while just 7% differed and 5% had irresolute perspectives. In connection to the sensitivity of the balance of nature (item 13), 83% agreed that it is fragile and can be disturbed easily, only 9% disagreed and 8% were uncertain. Item 8 considers anthropocentrism: with the majority of (70%) of the sample population being against this perspective and deviating from it drastically, 23% being in agreement with the view that the balance of nature is solid to such a degree as to adapt to the effects of modern industries, while only 7% of the sample held irresolute views.

#### **5.4.4. Anti-exemptionalism (NEP scale - items 4, 9 and 14)**

By definition, exemptionalism refers to the belief that the relation between people and the natural environment is not vital in light of the fact that people humans are 'exempt' from the natural forces and are equipped for adjustment by means of social and cultural changes.

An Anti-exemptionalism (ecocentrism) view makes an assumption that people reject human exemptionalism views of Mother Nature. These perspectives take

into account the thought that people are exempt from the limitations of nature. This view supports human mastery over the natural environment, and, moreover, the dominion of modern economics above nature.

With respect to item number 4, which states that human ingenuity will ensure that we do not make the earth unliveable; close to two thirds (61%) of the sample population have exemptionalism perspectives, while 22% have mild to strong (12%) views, and only 5% have undecided views. With respect to item 14, which stipulates that humans will eventually learn enough about how nature operates to be able to gain more control over it; the vast majority (64%) of the sample population has a mild (41%) to strong (23%) anti-exemptionalism worldview, whereas 8% were unsure of their options.

It appears to be obviously that the dominant part of the survey population has trust and confidence in human ingenuity and ability to beat the limitations of nature. All things considered, more than seventy five per cent of the sample population (83%) accept the thought that: "Regardless of their exceptional abilities, people are still subject to laws of nature" (item 9); just 11% differ and 6% of the sample population has ambivalent perspectives.

#### **5.4.5. Eco-crisis possibility (NEP scale - items 5, 10 and 15)**

Ecological crises will happen when the nature of a species or a population changes in a manner that destabilises its continued survival. The possible cause of such a crisis may incorporate, yet not be constrained to environment quality degradation compared to the species' needs, the earth gets to be unfavourable for the survival

of species and their populations and the circumstance gets to be unfavourable to the quality of life of the species and related populations.

In addition, the NEP scale focuses on the reliance of human on nature and the terrible results of human obstruction with nature. The dominant part of the sample population (87%) strongly agree (34%) and mildly agree (53%) with the statement identifying human misuse of natural environment (item 5), while 8% disagree and 5% hold undecided views. With respect to item 15 that set forward the likelihood of an ecological catastrophe, way over three quarters (92%) of the sample population agree that the present and continuous development of the general public is not sustainable, 3% disagree and 4% hold irresolute worldviews.

With respect to item 10, the sample population is quite divided on the case that the ecological crisis confronting the world today has been enormously over-exaggerated: 49% of sample population is in support of anthropocentrism, while the opposition sample came out at 40%, with 12% being unsure of their views.

## **5.5. Conclusion**

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This chapter presented the results from analysing the responses to the three central three questions of this research. The study findings revealed that, in general, residents exhibit favourable attitudes towards the protection of water resources. Considerable support exists for water resource protection with respect to: water resource quality protection, some specific regulations, and financing mechanisms – more especially those that make polluters pay. Resistance is strongest with respect to: water/sewer charges; refuse collection; income taxes; property levies and paying for new developments.

It also became clear that residents' attitudes towards water resource protection are governed by ecocentric environmental values. In light of these research findings, balanced programmes – which underscore the significance of a paying culture that supports the protection of water resources, along with particular enforceable regulations and financing systems – that make the polluter pay are recommended. Moreover, a subjective comprehension of people's environmental attitudes along with inherited environmental values should likewise be considered in the development of water resource protection measures. The following chapter will discuss the findings presented in this present chapter.



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## **CHAPTER 6:                   DISCUSSION**

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### **6.1. Introduction**

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The previous chapter was a presentation of the study findings. The aim of this chapter is to discuss these findings and draw some important conclusion. This is accomplished by blending the study findings in the context of the existing literature on environmental attitudes and doing some work on environmental management. This chapter is written into four sections. The first to be presented is the discussion on the nature and extent of attitudes towards the protection of the conditions of water. Secondly, a discussion of the environmental values that govern residents' attitudes towards the protection of water resources is provided. Thirdly, the implications of the study for environmental attitudes' research and water resource management will also be discussed. The last section wraps up the chapter by providing a summary of the main points acquired from the discussion.

### **6.2. The nature and extent of residents' attitudes toward water resource protection**

The study population for the research presented in this dissertation is residents in the upper Hennops River, specifically residential property owners of the townships of Tembisa, Rabie Ridge and Ivory Park. Although statistically based conclusions are based on findings regarding these township populations; results from this research on residents' attitudes towards water resource protection can be compared with and contrasted to other past study findings. Generalisations to theories can also be made, as is always a typical practice in social science

research. Social and demographic comparisons of the three townships reported by Statistics SA 2011 show that the views held by other populations are largely similar.

While residents in the study area exhibit higher levels of opposition to paying personally for measures aimed at protecting the conditions of water resources, focus on property owners may be attributed to this greater resistance to their being responsible for economic funding mechanisms compared to other populations groups, such as tenants and informal settlers. These groups have less at stake and are not directly affected by local legislations. Their viewpoints in relation to attitudes towards the protection of water resources are, however, not considered in this particular research. Subsequently, the investigation of water resource protection attitudes among tenants, informal settlers, business owners and other populations is an area of further research in the discipline of social science.

Overall, extensive opposition to all measures aimed at protection of water resources is rare among the study population. The rarity of opposition to water resource protection measures expressed by survey respondents is in line with previous research and was therefore anticipated (Roberts et al, 2010; Franzen and Vogl, 2013). Nonetheless, some previous work in this field has demonstrated that the denial of environmental problems in favour of 'business as usual' is common practice among the aspects of protection of the natural environment (Brand, 1997). Findings from this study revealed that some residents who perceive the condition of water resources as being good also exhibit less support for other protection measures, which may be related to the denial of problems. Generally, the low level of opposition (less than 1%) to the importance of the protection of water resources is comparable to the work of Adams (2003) and Struwig (2005) who demonstrated that the South African public, in general, does value the natural environment.

Various studies have established some sort of a linear relationship between environmental perception and environmental behaviour (Roth, 1970; Burgess et al, 1998; Kollmuss, 2002). In such manner, respondents who perceived water resource protection as important demonstrated favourable attitudes. Then again, the respondents who perceived protection of water resources as unimportant have shown unfavourable attitudes. On the other hand, respondents with uncertain perspectives are viewed as having neutral attitudes.

It is noteworthy that residents' division exists with respect to economic measures, particularly concerning funding mechanisms that make the offender pay, which was found to be the most supported than other identified economic measures. This is consistent with another important dimension that was discussed in chapter two, namely the anthropocentric value, which also appears to be an important attitudinal component to in favour of the protection of the environment (Tompson and Barton, 1994; Attfield, 2003).

Attitudes on the protection of the environment and related ecosystems vary significantly, such that aspects of resource protection vary vastly in terms of the magnitude of peoples' favour and disfavour. Understanding of these attitudinal dimensions is very crucial since they are an important part of the cognitive system and are related to people's environmental values (Heberlein and Black 1976).

According to McCormack (2005), efforts and strategies that are necessary for the successful protection of water resources are carried out by a number of agencies, organisations, and/or groups including provincial and local government agencies, water management organisations, non-government organisations, and local citizens. Other aspects of natural resource protection

measures that deserve attention and consideration are non-governmental measures, especially given the extent of opposition towards these institutions in this research.

A system that deals with the investigation of individuals' orientation of attitudes towards non-governmental and business institutions is recommended for future research on environmental attitudes. Moreover, it is also important to acknowledge that economic measures are the most opposed: with a higher level of indecisive views amongst all other measures aimed at the protection of water resources on average. Research on understanding individual's attitudes about incentive-based programmes is especially recommended given the fairly high opposition exhibited by the sample population toward these measures.

Much the same as other studies, within the field of social science, findings from this research advance an understanding in relation to peoples' attitudes towards the natural environment, particularly the protection of water resources.

### **6.3. Environmental values underlying residents' attitudes towards water resource protection**

Among others, the research presented in this dissertation sought to determine what environmental values underlie residents' attitudes towards the protection of water resources. Overall, the findings of this research revealed that residents' attitudes are governed by ecocentric environmental values, which is supported by the vast majority of the sample population.

Supporting the findings from previous research work in this discipline (Dunlap et al., 2000; Erdogan, 2009), the findings of this study confirm that ecocentric environmental values are supported by over half of the sample population. Less than a quarter (15%) of the sample

population opposed ecocentrism, with a very small fraction (6%) having an irresolute view. Regardless of the widespread support (79%) of the ecocentric motive among the sample population, residents also demonstrated a level of support of some aspects of anthropocentrism: for example, the technological positivity and never-ending natural resources and figuring out how to utilise such resources. From past studies, this finding is appropriately captured by Schwegler and Cornwell (1991), who demonstrated that, given the growing media coverage to the green environment, it seems that environmental concerns are turning into the socially accepted norm.

From the findings of this study, it seems that water resource protection attitudes among the study population are associated with residents' self interests. Ecocentrism seemed to be the underlying environmental value of residents' attitudes to subjects that do not affect the current lifestyle of individuals directly. The ethically accepted attitude of permitting equivalent rights to all living organisms, recognising that the stability of nature is delicate and that imbalance and interference can prompt an ecological crisis, where nothing can be done if not trailed by action from community level. The prospect of regulating developments near water resources is still disliked by many, while dismissing human exemptionalism is agreed on the description that is, to them, an obvious truth, namely people being subject to the laws of nature.

#### **6.4. Implication of the study**

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This study investigated residents' attitudes concerning environmental research and suggested how further research on environmental attitudes may be carried out. The research also has relevance in terms of actioning the management of water resources. From a practical point of view, this research suggests that the understanding of residents' environmental attitudes should

facilitate decision-making and suggest management practices in respect to water resource environments.

#### **6.4.1. Implications for environmental attitude research**

The findings of this study have implications for environmental attitudes research. The study suggests that it is essential to understand not only residents' attitudes toward the environmental protection, but also the environmental values that frame the basis of these attitudes. Investigating both environmental attitudes towards water resource protection and associated environmental values has led to an improved understanding of the nature and extent of support of and opposition to particular water resource protection measures.

The environmental values that govern residents' attitudes towards environmental protection are important to consider in environmental attitude research such as the investigation and development of strategies to encourage the protection and conservation of behaviours among the residents. Individuals who express support for environmental protection based on ecocentric values will be more likely to respond to various protection appeals than those who possess anthropocentric environmental values. For instance, an appeal to protect and conserve natural resources for self-centred reasons may be unsuccessful for individuals with ecocentric values towards the environment, but work very well for those with anthropocentric values. Future research on the interrelations between ecocentric and anthropocentric values and individuals' reactions to appeals to protect and conserve the natural environment should investigate this possibility.

A second implication is that environmental attitude research intended to increase residents' concern towards the natural environment should concentrate on expanding ecocentric-related

interest towards the environment instead of anthropocentric interest. Ecocentrically orientated individuals are more likely to possess a favourable attitude towards environmental protection and engage in the protection of the environment. Conversely, anthropocentric individuals are apathetic to the natural environment and less protecting over the conservation. Along these lines, environmental attitude research that endeavours to foster residents' interest in supporting environmental action for human-centred purposes may be counter-productive. In this regard, the study findings propose that a better angle of approach may be to highlight the intrinsic rewards of protecting and conserving the natural environment and also towards fostering appreciation of wildlife.

In sum, this study advances the social science understanding of residents' environmental attitudes towards natural resource protection by presenting the information gathered on the nature and extent of attitudes towards the protection of water resources.

#### **6.4.2. Implications on water resource management practices**

Based on the findings of this research, which illustrate a strong support for most water resource protection efforts, and substantial opposition towards others, policies and programmes resembling residents' preferred approaches to the protection of water resources are recommended. A balanced method of approach is recommended, which needs to include robust, flexible, specific, enforceable regulations. Findings from this research indicate that the manner in which water resources are protected, as well as how the public is involved in such efforts, is crucial to the acceptance of environmental protection programmes in general.

Water resource protection issues, just like any environmental problems, are certainly social issues that do not need only scientific and technological approach, but also require the

involvement of humans' psychological aspects. Commitments from the general public to water-related matters are impossible unless residents are made aware of and educated on water resource issues in their neighbourhood. A notable percentage of 'unsure' reactions to the questions relating to some water resource protection measures in this study demonstrate some degree of ignorance and reveal the lack of information and knowledge afforded to the general population in the study area. This finding may offer guiding information to the planning of water resource programs and awareness campaigns that concentrate on individuals in order to expand the mindfulness and enhance their knowledge. Generally, familiarity with water resource protection is an introductory stage in dealing with water resource issues, such as: contamination, wastage, and over-exploitation and degradation at a local level. As showed by Hu (2011), if residents' concerns about water resources are to be enhanced, they should first be urged to expand their knowledge and awareness and also be inspired to learn more about the importance of water resources in general. Based on this finding, this study strongly suggests the development of educational programmes with a specific end goal of enhancing residents' knowledge of the environment, especially water resources and the importance of their protection.

Public attitudes towards the protection of water resources are essential in light of the fact that they will, in the end, influence the extent to which people make a move to support public strategies and projects meant to maintain and enhance the quality of water resources.

The objective of this research was to look at residents' attitudes towards different aspects of water resource protection in the upper Hennops River catchment of South Africa. Understanding public attitudes towards the protection of water resources will empower policymakers to better comprehend the individuals' distinctions and shared opinions with



regard to water resource protection. Conversely, in view of the residents' disparities concerning environmental values, the side-lining of their attitudes in the administration of water resources will result in the development and finalisation of one-sided policies which may fail to recruit adequate resident support that is important to implement a policy successfully. In this regard, the consideration of residents during strategy-planning to express their attitudes may lead to constructive debates and negotiations to cooperative planning to better address water resource protection problems.

The implications of residents' environmental values along with the support for water resource protection efforts to the management practices of water resources are summarised as follows. As respondents show that they hold values towards the importance of environmental protection and exhibit more ecocentric values; it was highly likely that respondents gave a higher rating for most efforts aimed at the protection of water resources within the area of study. However, it must be remembered that respondents demonstrated vast opposition for some financial-based measures. This opposition may be related to the costs associated with such regulation. Such measures differ significantly in their configuration and implementation, and residents' attitudes are likely to differ depending on these details as well. To engage these residents to change their view of financially based efforts towards the protection of water resources; policy formulators must comprehend the basis of their decisions and discover the common points among them.

Drawing from the above, this research has important implications for management practices of water resource environments. Specifically, the findings of this research suggest that the understanding of residents' attitudes towards water resource protection should inform decisions associated with developments of all protection and conservation measures.

## **6.5. Conclusion**

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The current chapter presented a discussion of the three research questions of this study. In general, the rarity of opposition to measures aimed at the protection of water resources was presented. This was further confirmed by some previous work that researched the valuing of natural environments among the South African public. It also became clear that it is important to understand not only attitudes toward the water resource protection, but also the environmental values that form the basis for those attitudes. While ecocentrism seems to be the main underlying environmental attitude among residents, a handful of respondents exhibited some affiliation to anthropocentrism. The significant role played by this study in the theoretical understanding of environmental attitudes was discussed along with its contributions to the management of water resources. The following chapter wraps up this dissertation by providing the conclusion.

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## CHAPTER 7: CONCLUSION

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To recap, this study sought to understand residents' attitudes towards the protection of water resources. Primarily, attitudes were assessed in terms of the perceived importance of protecting water resources along with the nature of and extent to which residents support or oppose different measures aimed at protection of water resource. In order to improve the understanding of residents' nature of attitudes, this study also assessed the environmental values that govern residents' attitudes towards water resource protection. The study aimed to contribute to the research and the existing knowledge on residents' environmental attitudes and water resource management practices in South Africa, specifically in the upper Hennops River catchment.

The overall findings of this study demonstrate favourable attitudes among residents in the township of Tembisa, Rabie Ridge and Ivory Park. Precisely, the vast majority of residents exhibited their interests in the importance of protecting water resources in general and also for a particular purpose. Similarly, a number of residents showed significant support for various measures aimed at the protection of water resources. In addition, findings demonstrate that residents' attitudes towards protection of water resources are governed by ecocentric values. In light of this finding, measures are recommended that put emphasis on land use regulations and funding mechanisms, especially 'the polluter pays' principle. While punishing residents who degrade water resources remains the greatest supported funding mechanism, incentives are likewise recommended that recognise compliance and protection practices among property owners. For this to be achieved successfully, policymakers should also incorporate equity as a critical criterion for such water resource protection efforts.

In terms of the environmental values that govern residents' attitudes, the study's findings demonstrate that residents' attitudes towards the protection of water resources are based on ecocentric values. More specifically, the majority of residents expressed their agreements with the ecocentric statements of the New Ecological Paradigm scale. In terms of limits, residents are in support of the ecocentric idea that the earth will probably reach a maximum carrying capacity as they accept the allegory of the earth as a spaceship. Fascinatingly, in spite of the fact that the sample population acknowledges the spaceship illustration, they likewise embrace the self-contradicting belief of there being plenty of natural resources on Mother Earth. On the topic of the rejection of the anthropocentric motive, the sample's population holds a robust ecocentric view, with a clear rejection of anthropocentrism. When it comes to the delicateness of the balance of nature, the sample population holds a stronger ecocentric motive: it is generally accepted in the area of study that the strength of nature's balance is weak and cannot cope with modern industrial societal impacts. The sample population likewise expresses ecocentrism on the question of a dismissal of human exemptionalism from Mother Nature. Residents acknowledge the thought of mankind not being exempt from the laws of nature. However, interestingly, they additionally hold some deliberate measure of trust and confidence in human ingenuity and their capacity to beat the imperatives of nature. On the subject of the probability of an ecological crisis, the sample population also exhibits ecocentrism. Across all items of the survey, a very low percentage of the sample population holds irresolute views. In this case, residents' attitudes towards the protection of water resources in the upper Hennops River catchment are motivated by ecocentrism.

## **7.1. Suggestions for further research**

Areas for further research were mentioned briefly throughout the previous discussion of findings from this study. Crucial areas of research will now be summarised in this section. Both additional analyses of the established data for this research and further investigations requiring additional data collection efforts will be presented in this section.

Given the relatively low extent of variation on residents' attitudes and associated environmental values underlying such attitudes; additional research is required to enhance the understanding of the factors that explain residents' attitudes towards the protection of water resources. With the quantitative data collected for this research, further qualitative research on residents' attitudes towards water resource protection may provide further insight into the nature of residents' attitudes and explanations for them.

Findings of this study revealed that the government's economic policy tools (i.e. funding mechanisms) are the most opposed of all other measures and also the one with the highest level of indecisive views of all other measures intended for the protection of water resources on average. In this regard, further investigation of the opinions and beliefs about government policies, including in-depth analyses of funding mechanisms, is particularly worthwhile given substantial opposition to the government's economic policy tools aimed at the protection of water resources. This future research should address clearly how residents' views are formed, since this information may help government agencies to increase public support for their efforts and, more generally, improve the government relationship with residents. It is also important that the findings of this research showed a major preference for funding mechanisms that 'make the polluter pay'. While funding mechanisms that provide a penalty to degrading water resources are substantially supported by residents (e.g. views that the polluter pays fines

for land use violations); equally so, positive approaches that acknowledge and reward individual practices that protect and improve the conditions of water resources need to be investigated further.

Because of the significant findings regarding residents' perceptions about the condition of water resources within the study area, additional research is required to enhance understanding of the formation and development of these perceptions in relation to actual conditions. Specifically, peoples' awareness and beliefs about the problems facing retaining water resources and the solutions to resource degradation and protection require further investigation.

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# APPENDICES

## APPENDIX A: Human Ethics Certificate of Approval



**MONASH** University

**Monash University Human Research Ethics Committee (MUHREC)**  
Research Office

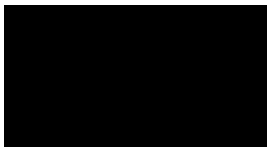
### Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

**Project Number:** CF13/3593 - 2013001848  
**Project Title:** Township Residents' Attitudes Towards protection of Water Resources in the Upper Hennops River Catchment: South Africa  
**Chief Investigator:** Assoc Prof Bimo Abraham Nkhata  
**Approved:** From: 6 January 2014 To: 6 January 2019

**Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.**

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson  
Chair, MUHREC

cc: Mr Jabulani Makondo

Postal – Monash University, Vic 3800, Australia  
Building 3E, Room 111, Clayton Campus, Wellington Road, Clayton  
Telephone +61 3 9905 5490 Facsimile +61 3 9905 3831  
Email [muhrec@monash.edu](mailto:muhrec@monash.edu) <http://www.monash.edu.au/researchoffice/human/>  
ABN 12 377 614 012 CRICOS Provider #00008C

## APPENDIX B: Explanatory Statement



# MONASH South Africa

A campus of Monash University Australia

Private Bag X60, Roodepoort 1725, South Africa  
144 Peter Road, Ruimsig, Johannesburg, South Africa

### EXPLANATORY STATEMENT

**Project title:**

*Township residents' attitudes towards protection of water resources in the upper Hennops river catchment: South Africa.*

**Chief Investigator's name: Bimo Nkhata**  
**Department of Arts**

**Student's name: Jabulani Makondo**  
**Department of Arts**

*You are kindly invited to take part in this research. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this research, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.*

Efforts are underway in your area and the rest of South Africa to manage water resources such as streams, dams, rivers, lakes, and wetlands. The views of residents such as yourself are important for understanding the extent of public support for and concerns about these efforts. I kindly invite you to express your views about these issues in this survey, which takes approximately 10 - 15 minutes to complete.

Your response to this survey is important for gathering an accurate picture of residents' views on water resource management and protection in South Africa. You are requested to answer all questions freely from a variety of viewpoints; there is no wrong and right answer to all questions. All questions are intended to understand your views and concerns regarding protection of water resources.

Your responses to the questions in this survey will remain confidential and will be reported anonymous with others as statistical summaries only. All information will remain with the researcher for the entire duration of the study. No other persons can access the information.

Though I am conducting this research for my Master's degree at Monash South Africa, the results of this survey will be summarized and distributed to inform and improve water resource management efforts in your area and across South Africa. In appreciation of your contribution in this study, and if it is in your interest, I will provide you with a short version (article) of the study upon completion.

Thank you for your time. Your input is vital to this study and is greatly appreciated.

Kind regards,  
Jabulani Makondo  
Student – Monash South Africa

## APPENDIX C: Survey questionnaire

This survey aims to collect information on water resources issues in the townships of Tembisa, Rabie Ridge and Ivory Park. The term “water resources” refers to Streams, rivers, lakes, dams and wetlands.

Please tick one answer in the box for your response to each question.

**Please note: “THERE IS NO WRONG OR WRITE ANSWER”.** All questions are aimed at collecting information on water issues.

### 1. GENERAL ENVIRONMENTAL BELIEFS

1.1. Please indicate the degree to which you agree or disagree with the following statements.

1	The world population is increasing and soon there will be more people than what the earth can support.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
2	People have the right to modify the natural environment to suit their needs.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
3	When people interfere with nature it often results in environmental problems.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
4	Responsible behavior will ensure that the earth does not become unlivable.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
5	People are seriously abusing the environment.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
6	The Earth has plenty of natural resources.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
7	Plants and animals exist primarily to be used by people.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
9	Despite their special abilities, people are still bound to the laws of nature.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
10	Environmental problems that are facing people today are over exaggerated.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
11	The Earth has limited space and resources.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
12	People were meant to do whatever they want on earth.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
13	The balance of nature is not strong and can be destroyed easily by people.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
14	Eventually, people need to learn enough about how nature works to be able to control it.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
15	If things continue on their present state, people will soon experience a major environmental disaster.	Strongly agree	Agree	Unsure	Disagree	Strongly disagree

**2. PERCEIVED IMPORTANCE FOR PROTECTING WATER RESOURCES**

**2.1. In what condition do you think water resources such as rivers, dams, streams, lakes, and wetlands are in your area?**

Very good	Good	Fair	Bad	Very bad
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**2.2. In general, how concerned are you with the conditions of water resources such as rivers, dams, streams, lakes, and wetlands in your area?**

Very concerned	Concerned	Unsure	Not concerned	Not concerned at all
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**2.3. Overall, how important do you think it is to protect the condition of water resources in your area?**

Very important	Important	Unsure	Not important	Not important at all
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**2.4. How important do you think it is to protect the condition of water resources in your area for each of the following?**

Drinking water quality	Very important	Important	Unsure	Not important	Not important at all
Clean streams, dams and rivers	Very important	Important	Unsure	Not important	Not important at all
Flood control (storm water drainage)	Very important	Important	Unsure	Not important	Not important at all
Wildlife habitat (Fish, crocodiles, frogs, etc..)	Very important	Important	Unsure	Not important	Not important at all
Agriculture (farming, irrigation, livestock)	Very important	Important	Unsure	Not important	Not important at all
Public use and enjoyment (swimming, picnics, etc.)	Very important	Important	Unsure	Not important	Not important at all
Other (specify)	Very important	Important	Unsure	Not important	Not important at all

**3. DEGREE OF SUPPORT/OPPOSITION TO DIFFERENT INSTITUTIONS OF GOVERNMENT**

**3.1. How important do you think it is for government and other organizations to put efforts for the purpose of protecting water resources?**

Very important	Important	Unsure	Not important	Not important at all
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**3.2. To what degree do you support or oppose efforts by each of the following institutions to protect the condition of water resources in your area?**

Local municipality	Strongly support	Support	Unsure	Oppose	Strongly oppose
National government	Strongly support	Support	Unsure	Oppose	Strongly oppose
Non-profit organizations	Strongly support	Support	Unsure	Oppose	Strongly oppose
Community organizations	Strongly support	Support	Unsure	Oppose	Strongly oppose
Business for profit	Strongly support	Support	Unsure	Oppose	Strongly oppose
Other (specify)	Strongly support	Support	Unsure	Oppose	Strongly oppose



**4. DEGREE OF SUPPORT OR OPPOSITION TO SPECIFIC POLICY TOOLS**

**4.1. How important do you think it is for government to regulate land use rights for the purpose of protecting water resources in your area?**

Very important	Important	Unsure	Not important	Not important at all
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**4.2. To what degree do you support or oppose the following types of government regulations for protecting the condition of water resources in your area?**

Restricting how new developments is constructed near water resources	Strongly support	Support	Unsure	Oppose	Strongly oppose
Restricting removal of trees and vegetation near water resources	Strongly support	Support	Unsure	Oppose	Strongly oppose
Restricting types of vegetation that can be planted near water resources	Strongly support	Support	Unsure	Oppose	Strongly oppose
Other (specify)	Strongly support	Support	Unsure	Oppose	Strongly oppose

**4.3. To what degree do you support or oppose the following types of government regulations for protecting the condition of water resources in your area?**

Residential (housing) areas	Strongly support	Support	Unsure	Oppose	Strongly oppose
Commercial areas (stores, offices)	Strongly support	Support	Unsure	Oppose	Strongly oppose
Industrial areas (firms)	Strongly support	Support	Unsure	Oppose	Strongly oppose
Agricultural areas (irrigation, stock)	Strongly support	Support	Unsure	Oppose	Strongly oppose
Recreation (parks and open areas)	Strongly support	Support	Unsure	Oppose	Strongly oppose
Other (specify)	Strongly support	Support	Unsure	Oppose	Strongly oppose

**5. DEGREE OF SUPPORT OR OPPOSITION TO VARIOUS FUNDING MECHANISMS**

**5.1. How willing are you personally to pay for efforts aimed at protecting the condition of water resources in your area?**

Very willing	Willing	Unsure	Not willing	Not willing at all
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**5.2. To what degree do you support or oppose paying for the following tariffs aimed at protecting the condition of water resources in your area?**

Water/Sewer charges	Strongly support	Support	Unsure	Oppose	Strongly oppose
Refuse collection charges	Strongly support	Support	Unsure	Oppose	Strongly oppose
Income taxes	Strongly support	Support	Unsure	Oppose	Strongly oppose
Property levies	Strongly support	Support	Unsure	Oppose	Strongly oppose



