

**The role of the church in water related
environmental issues with reference to
the Emfuleni Local Municipality**

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DECLARATION

I the undersigned, Motaung Motoaitoai Johannes hereby declare that the work contained in this dissertation entitled *The role of the church in water-related environmental issues with reference to the Emfuleni Local Municipality* is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature: Motaung Motoaitoai Johannes

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ABSTRACT

The dissertation examines the role that the church can play in environmental affairs in the Emfuleni Local Municipality in the context of what is an increasingly observable water crisis. The aim is to develop a contextual approach to water related matters. The research does not only focus on water but also incorporates climate change challenges, which directly impact rain patterns and the supply of water in South Africa. The research recognises the role that churches play as part of their contribution towards addressing the ecological challenges such as anthropogenic climate change specifically in the form of water pollution, as well as ecological interventions such as preservation. This role is based on the understanding of the cultural mandate of the Church. The missional church has an obligation to address this issue through Christian mission that takes the biblical mandate to care and preserve the integrity of creation. Finally, the research aims to assist churches to understand the theological basis for eco-theology in order to develop an appropriate ecological mission.

Keywords

Climate change, ecological theology, cultural mandate, environmental crisis, local churches

TABLE OF CONTENTS

Declaration	i
Acknowledgements	ii
Abstract	iii
List of tables and figures	ix
List of abbreviations	xi
CHAPTER 1: ORIENTATION AND PROBLEM STATEMENT	1
1.1. Background information	1
1.2. Problem statement	7
1.3. The purpose statement of the investigation	10
1.4. The relevance of the study	11
1.5. The scope and the limitations of the investigation	14
1.6. Method of study	15
1.7. Chapter division	15
1.7.1. Chapter 1: Orientation	15
1.7.2. Chapter 2: Literature review	15
1.7.3. Chapter 3: Environmental scan of water-related issues in the Emfuleni Local Municipality	16
1.7.4. Chapter 4: Study of churches in the Emfuleni Local Municipality's involvement in water-related environmental issues.	16
1.7.5. Chapter 5: Conclusions and Recommendations	16
CHAPTER 2: LITERATURE REVIEW	17
2.1. Introduction	17
2.2. Establishing a scientific theoretical basis for water environments	17
2.2.1. Scientific facts on anthropogenic climate change/global warming	17
2.2.2. What is climate?	18
2.2.3. What is the impact of climate change/global warming?	19
2.2.4. Scientific basis for climate change	21

2.2.5. Water as central to climate change	23
2.3. Exploring a biblical framework related to water	28
2.3.1. What is the biblical cultural mandate?	29
2.3.2. The biblical significance of water	30
2.3.2.1. Uses of water in the Old Testament	32
2.3.2.2. Uses of water in the New Testament	34
2.3.3. Biblical perspectives on man’s sin and its impact on nature	38
2.4. Reviewing theological concepts on water	38
2.4.1. Hermeneutics and eco-theology	39
2.4.2. The contribution of the Earth Bible project to ecological hermeneutics	42
2.4.3. The contributions of the Exeter Project to ecological hermeneutics	45
2.4.4. The theology of sin from the perspective of caring for creation	46
2.5. Examining ethical principles related to water	50
2.5.1. Transforming Christian attitudes on environmental matters	51
2.5.2. The power of influence that Christians possess	54
2.5.3. The eco-mission and Christian obligations	55
2.6. Conclusion	57
CHAPTER 3: ENVIRONMENTAL AND SOCIO-POLITICAL SCAN OF EMFULENI LOCAL MUNICIPALITY	60
3.1. Introduction	60
3.2. The early history of the Vaal Triangle	60
3.3. Emfuleni Local Municipality	61
3.4. Population	62
3.5. Level of education	62
3.6. Water and sanitation provision in Efuleni Local Municipality	63
3.7. Water pollution in Emfuleni Local Municipality	67
3.8. ELM water treatment plants	73

3.9. ELM environmental policies: the environmental impact management policy of 2009 and water and sanitation bylaws of 2004	73
3.9.1. Environmental impact management policy	74
3.9.2. Environmental compliance monitoring and enforcement	74
3.9.3. Industrial environmental impact management	75
3.10. Water and sanitation bylaws of 2004	75
3.11. Environmental NGOs operating in ELM	76
3.11.1. Vaal Environmental Justice Alliance (VEJA)	76
3.11.2. Save the Vaal Environment (SAVE)	77
3.12. The industrial development of ELM	80
3.13. Church communities in ELM	81
3.13.1. Nederduits Gereformeerde Kerk (NGK)	81
3.13.2. Nederduitsch Hervormde Kerk (NHK)	81
3.13.3. Gereformeerde Kerk (GKSA)	81
3.13.4. The Methodist Church	82
3.13.5. The Anglican Church	82
3.14. The development of churches in townships	82
3.15. Major political events in ELM	83
3.15.1. Sharpeville Massacre (1960)	83
3.15.2. Vaal rent boycotts (1984 – 1986)	84
3.15.3. Boipatong Massacre (1992)	85
3.16. Conclusion	85
CHAPTER 4: EMPIRICAL RESEARCH DESIGN AND METHODOLOGY	87
4.1. Introduction	87
4.1.1. Significance of the study	87
4.2. Research design and methodology	88
4.2.1. The questionnaire as research instrument	89

4.3. Literature review	90
4.4. Empirical research	91
4.4.1. Aim of empirical research	91
4.5. Ethical issues	91
4.6. Research methodology and sampling	92
4.6.1. Structure of the questionnaires	92
4.6.2. Construction of the questionnaire	93
4.7. Validity and reliability	95
4.7.1. Validity	95
4.7.2. Reliability	95
4.8. Data analysis	96
4.9. Survey results and findings	96
4.10. Congregation data and results analysis	96
4.10.1. Demographic information of congregants	96
4.11. Research results findings	105
4.11.1. Awareness	105
4.11.2. Participation	108
4.11.3. Biblical understanding	111
4.12. Final congregation outcome and conclusion	113
4.13. Biographical information for priests	113
4.14. Priests' Questionnaire responses	119
4.14.1. Awareness	119
4.14.2. Priests' participation	120
4.14.3. Priests' biblical understanding	123
4.14.4. Church strategy, priest training and programmes	124
4.14.5. Findings related to research aim 1	126
4.14.5.1. Congregants	127

4.14.5.2. Research aim 2: Priests' questionnaire response	128
4.15. Final conclusion	130
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS	132
5.1. Introduction	132
5.2. Conclusion	133
5.3. Recommendations	133
5.3.1. Participation and awareness is the result of biblical understanding	133
5.3.2. The Church's strategy to be intentional on encouraging teaching on environmental issues	134
5.3.3. Catholic Social Teaching (CST)	134
5.3.4. Clear strategy to be adopted by church leadership	134
5.4. Limitations of the study	135
5.5. Suggestions for further studies	135
Annexure A	147
Annexure: B	150
Annexure: C	155
Annexure D	160

LIST OF TABLES AND FIGURES

Figure 3.1: Population distribution of ELM according to 2011 data (source: Statistics South Africa –2012/13).	62
Figure 3.2: Education level of residents in ELM according to 2011 data (source: Statistics South Africa – 2012/13).	63
Table 3.1: Household source of water of ELM residents (source: Statistics South Africa – 2011/16).	65
Table 3.2: Total use of water by sector in cubic metre (source: ELM IDP 2019/20).	65
Table 3.3: Type of household toilet facilities for 2011 and 2016 (source: Stats SA–2011/16).	66
Figure 3.3: an image of wastewater flowing down the Klip River into the Vaal River Barrage (Tempelhoff et al., 2007:14).	71
Figure 3.4: a young child next to an unspecified polluted waterway in the Vaal Triangle (vaalenvironmentalnews.blogspot.co.za).	72
Table 3. 4: sewage treatment plants in ELM (source: ELM IDP draft, 2007/8:40).	73
Table 4.1: Questions related to different categories	95
Table 4.2: Age	96
Table 4.3: Gender	98
Table 4.4: Ethnic group	98
Table 4.5: Home language	99
Table 4.6: Residential area	100
Table 4.7: Qualifications	101
Table 4.8: Employment	102
Table 4.9: Monthly income	103
Table 4.10: Position in church	104
Figure 4.1: Awareness of congregants.	106
Figure 4.2: Participation of congregants.	109
Figure 4.3: Biblical understanding of congregants.	111
Table 4.11: Age	113

Table 4.12: Gender	114
Table 4.13: Ethnic group	115
Table 4.14: Residential area	115
Figure 4.4: Awareness of priests	119
Figure 4.5: Participation of priests.	121
Figure 4.6: Biblical understanding of priests	123
Figure 4.7: Priest – strategy, training and programmes.	125

LIST OF ABBREVIATIONS

AMD	Acid mine drainage
AME	African Methodist Episcopal
CER	Centre for Environmental Rights
CSIR	Council for Scientific and Industrial Research
CST	Catholic Social Teaching
DWA	Department of Water Affairs
EAI	Environmental Assessment Investigation
ELM	Emfuleni Local Municipality
FBO	Faith-based organisations
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
NBS	Natural-Based Solutions
NGK	Nederduits Gereformeerde Kerk
NGO	Non-governmental organisations
NHK	Nederduitsch Hervormde Kerk
SACC	South African Council of Churches
SAEON	South African Environmental Observation Network
SAFCEI	South African Faith Communities' Environment Institute
SAVE	Save the Vaal Environment
VCT	Voluntary counselling and testing
VEJA	Vaal Environmental Justice Alliance
WARC	World Alliance of Reformed Churches
WCC	World Council of Churches
WHO	World Health Organisation
YWG	Yellow fish Working Group

CHAPTER 1: ORIENTATION AND PROBLEM STATEMENT

1.1. Background information

The earth has experienced numerous changes since its formation, some of which are natural and others caused by human influence. According to Rich (2019) the world is on the brink of disaster in light of the statement made by the climate scientist James Hansen who called a 2.0 °C rise in temperature “a prescription for long-term disaster”, and three degree warming “a prescription for short-term disaster” (Rich, 2019). This is the time for all hands to be on deck and to seriously fight the looming climate change disaster, and to save both human lives and the rest of creation from this impending catastrophe that all is facing and that has been caused largely by human actions. South Africa in particular has experienced some of the effects of climate change with changes in weather patterns. It is now believed that parts of South Africa have, over the past few years, experienced these changes as lower levels of rainfall (Mukheibir & Sparks, 2006:1). These changes also included extreme cold weather, severe drought particularly in the Western and Northern Cape, as well as excessive rain in some provinces. These environmental and ecological changes have been caused by the climate changes which have affected the ecosystems and are impacting all living organisms such as earth plantations, creatures and humans. The changes in the weather pattern have affected human lives and may have resulted in the loss of livestock, vegetation and aquatic life. The most recent drought prompted the Western Cape provincial government and the Cape Town local government to introduce water rationing to residents. This highlighted the water supply challenge and the need to preserve water. The South African Government started involving communities in water usage awareness programs and also regulating water usage by citizens in order to conserve water.

Mozambique and Zimbabwe recently experienced tropical storms, like "Idai", that took hundreds of lives, destroyed houses and infrastructure and left thousands of people destitute and displaced. Shortly after this storm, South Africa experienced heavy rains, particularly in the Eastern Cape and KwaZulu-Natal and more than a hundred lives were lost and several people were left destitute. These extreme weather conditions are often accepted to be the result of global warming. South Africa is classified among countries that will experience scarcity of water due to climate change and has to manage and preserve water resources (WWAP, 2018:12). The Christian community as custodians of the earth (Gen. 1:28) has to realise that

climate change is real and has started to affect lives, and thus answer to their calling to be advocates of the cultural mandate to keep and preserve the earth as mandated in Genesis 2:15. Against this background, it is clear that the world is facing challenges due to what is labelled anthropogenic climate change, thus requiring humans to change their current life style and behaviour in order to mitigate and hopefully reverse the effects of climate change.

These changes to the climate have been predicted by meteorologists and scientists as potential effects of global warming and have affected almost all living organisms. Various organisations, including the Intergovernmental Panel on Climate Change (IPCC), have been studying anthropogenic climate changes noticeable in the ecosystem. After various scientific research projects, the IPCC report of 2007 presented scientific proof that indicated the current anthropogenic climate change to be the result of industrialisation (IPCC, 2007:10). The climate change experienced was proven to be anthropogenic, induced over many decades by chlorofluorocarbons (CFCs) and other ozone-depleting substances and has created huge damage. Humans remain responsible for the catastrophic climate change, resulting in a 1.5°C rise in atmospheric temperature, of which 1.0°C can be attributed to industrialisation that has damaged the atmosphere over many decades (IPCC, 2018:6). The climate change does not only affect South Africa, but the entire world; however, this study will concentrate on South Africa with the primary focus on the impact of climate change on fresh water resources.

Jimenez Cisneros (2014:232-233) focused on the impact that climate change had on freshwater resources and hydrological changes. Climate change will create risks such as a reduction in renewable surface and ground water in dry subtropical regions resulting in intensified competition for water among agriculture, ecosystems, and industry. This will ultimately impact on regional water and food security. The climate change may further increase the frequency of droughts and will impact freshwater ecosystems by changing stream flows and water quality that in turn will affect animal and human lives. This can be seen as scientific evidence of the correlation between water resources and climate change.

The focus of this study will be to investigate the impact these climate changes have on water supply patterns in South Africa, as well as other human factors such as pollution of scarce water that impacts negatively on freshwater supply. The study will further investigate the role that Christian communities in particular can play to curb such negative outcomes.

The above identified anthropogenic climate changes may lead one to question whether humans have been faithful in fulfilling the mandate that God has given to them to take care of creation. According to Genesis 1:26-28, humanity was given the mandate to look after creation as stewards. This study will look at the role that humanity played concerning the cultural mandate given to him regarding the earth and creation as a whole; especially considering the current climate change which has begun to destroy various fauna and flora.

DesJardins and McCall (2005:2) stated that business is one the most powerful and influential social institutions in human history:

“The decisions made in business affect nearly every aspect of contemporary life. What we eat, where we live, if and how we work, how we are governed, how we spend leisure time, and how much access we have to education and health care are all strongly influenced by what happens in the business world.”

This may seem to put a huge responsibility on these institutions as its action and practices have an enormous impact on the well-being of both humans and the rest of creation. Humans must be educated and made aware of their behaviour that contributes to the increase in production as a direct result of high consumption by people.

Also, the impact of humans through industrialisation needs to be studied with the aim to understand how to change behaviour to mitigate the climate change challenge. The impact of global warming on human lives and creation is already very clear. The importance of industrialisation cannot simply be undermined because it has also contributed to the well-being of humans and the planet. Van Dyke et al. (1996:14) state: “industrialisation is necessary for the development of humanity in the attempt to improve human life. The increase in the human population has further led to concomitant increase in industrialisation. This ever-increasing demand for industrialisation has contributed to the various environmental challenges that exist today.” The 2007 IPCC report and other scientific research projects have proven that human actions have contributed to the current climate changes, which in turn impact fresh water availability. Increasing industrialisation is threatening the future well-being of the earth and creation and thus forces ethical debates regarding the impact it has on the environment. The 2007 IPCC report may indicate that industrialisation and development will result in the unintended consequence of negatively impacting the life that it initially intended to improve, unless other production methods with minimal impact on the environment are explored. Northcott (1996:2) asserted that “the single most pervasive and potentially cataclysmic factor

in the ecological crisis is that of climate change. Local climate change is a feature of life in many tropical and subtropical regions”. This study will focus on water scarcity and supply in South Africa in the context of climate change. The Department of Environmental Affairs and Development Report 3 (2018:1) acknowledged that currently climate change is beyond human control and classified South Africa as a country that will be affected more by climate change and is called to address the negative impact thereof.

The Western Cape Department of Environmental Affairs Strategy (DEA & EP, 2018:1) accepted the reality of climate change when it stated:

“The science on climate change is unequivocal – it is happening, it is anthropogenic in origin and it is happening in a ‘worst case scenario’ as global and local responses are proving to be inadequate. Indeed, since the first of these M&E reports was published in 2016, the Western Cape has experienced a considerable onset of several climate-related disasters, the drought being the most far reaching and economically and socially devastating”.

The report further highlighted that sub-Saharan Africa will, to a great extent, be negatively impacted by global warming in the region and projects increases of 1.5° to 3.0° C that may double by the end of the century if current emissions continue.

All creations and creatures need water to live because water sustains life and means livelihood. Water is the key requirement for agriculture and for industrial development and access to water is the way for communities and countries out of poverty (WWAP, 2009:v). Water is linked to the crises of climate change, energy and food supply. Failure to address water crises around the world may intensify and local water crises may worsen, converging into a global water crisis that will also be political and lead to insecurity and conflict at various levels. It is for this reason that the United Nations’ millennium development goals have included water at the centre of reaching these goals (WWAP, 2009:xx). This highlights the significance of water in creation and why water must be preserved and handled with extreme care.

The recent evident climate and environmental changes demand all sectors of our communities such as scientists, environmental experts, economists, politicians, and religious bodies to jointly seek solutions to this complex and multifaceted crisis facing the world. It is for that reason that recent IPCC reports (e.g. for 2014-2018) are also focusing on potential solutions to mitigate the effects of global warming. South Africa, like the rest of the world, particularly as a country negatively affected by the climate change, should put in place plans to manage how

the impact of climate change on water resources has to be managed for ensuring future supply and the country's economic sustainability. South Africa is faced with both water and energy challenges, which are the epicentre of a country's development. The need to find solutions to this challenge has escalated to the UN and business forums, such as G seven meetings.

This research focuses on the role Christianity can play in this regard and to evaluate its contribution in mitigating the impact of the climate change scourge. This is in line with Hill's assertion that the impact of Christians cannot be underestimated, especially with its followers tipping over a billion people (Hill, 2007:5). The need to mobilise various sectors to fight climate change and its impacts on the world has grown and various organisations have been formed to contribute to the mobilisation of communities against climate change. In South Africa, this drive resulted in several organisations being formed by both Non-Governmental Organisations (NGOs) and Government institutions. The impact of such organisations will be investigated especially when looking into the Emfuleni Local Municipality, which is the specific focus area of the study. Some organisations may be operating at national level while others work on regional level. Amongst many organisations operating nationally in South Africa, the South African Faith Communities' Environment Institute (SAFCEI) and South African Environmental Observation Network (SAEON) will be discussed.

SAFCEI (2017) was established in 2005 and has adopted the following objectives in order to contribute to the mobilisation of the faith communities by raising awareness on climate change issues:

- Raise environmental awareness.
- Engage in formulating policy and ethical guidelines within our faith communities.
- Facilitate environmental responsibility and action.
- Confront environmental and socio-economic injustices.
- Support environmental training and learning.

As indicated above, the organisation has the objective of focusing on faith communities in challenging them to be active in matters relating to climate change and "Earth Keeping". The effectiveness of such an organisation is seen by the engagement of faith communities in matters relating to climate change with the focus on water resources. Climate change is the biggest challenge in the provision of water resources. As seen in large organisations, such as the United Nations, collaboration between various stakeholders is vital in ensuring that all aspects of

climate change are evaluated. Organisations differ from each other in that some are focussing on science to support and collaborate with government institutions, while others are interested in stakeholders for benefiting local communities in South Africa.

SAEON is a research organisation operating under the National Research Foundation, which supports research projects on environmental and climate changes with the objective of providing reliable data for climate research. It was established in 2002 after a process of deliberation within the research community.

SAEON (2017) has as its objective the following:

“Earth observation science which measures and records the changes in the climate in order to bring more certainty about environmental change, and to enable formulation of adaptive and mitigating management policies and practices, for themes ranging from food production to population health”.

The role that SAEON has played in the South African environment is pivotal and has supported numerous research projects with the Water Research Commission that has contributed to scientific evidence found on the impact of climate change on water resources and supply in South Africa.

The seriousness of climate change has been aptly described by Bouma-Prediger (1995:1) almost two and a half decades ago, when he said: “with each daily newspaper and television report, we are shaken from our comfortable ignorance about the state of our earthly home and confronted with an ecological crisis that, like crescendo, is growing to unimaginable and genuinely frightening proportions. Global warming, holes in the ozone layer, toxic wastes, oil spills, acid rain, drinking water contamination, overflowing landfills, topsoil erosion, species extinction, destruction of rain forests, leakage of nuclear waste, lead poisoning, desertification, smog – such is merely partial litany of worry and woe”.

The objective to understand the impact of climate change on water resources in South Africa was further enhanced by the partnership between the South African Government, industry and NGOs. The introduction of new Environmental Statutes and Laws has opened the door to enforce participation of various stakeholders in environmental issues. The establishment of various water catchment committees by the Water Act has stipulated that such committees should involve all stakeholders, inviting the community and other interested parties to be

eligible to take part in the discussion of water-related matters. This action has prompted the start of environmental activism, creating strong community participation and consciousness.

The South African Government, through the National Environment Management Act (NEMA) (107 of 1998), stipulates and makes provision for all projects with potential environmental impact to be debated by the communities, prior to these being implemented. In this way, it is believed that the community can give meaningful input concerning for instance what acceptable norms for environmental pollution are; hence ensuring the long-term sustainability of the ecosystem. This opportunity will not be effectively used unless the communities, including the churches, take an active role during such Environmental Assessment Investigation debates to ensure that the ecosystem is conserved, while much needed development takes place. This study will investigate the activism of local churches in such structures in advocating for the society to care, respect and protect the water resources in their immediate communities. Emfuleni Local Municipality, as will later be seen, provides the right context where such activism is required in protecting and preserving water resources because of the extent of industrialisation as well as the limited reservoir of fresh water supply to Gauteng and some parts of Northwest.

1.2. Problem statement

For various reasons, the Christian tradition is directly or indirectly held responsible for the present ecological crisis (Bouma-Prediger, 1995:2-3). This has resulted in debates and engagement of different faith communities over many years and it has since been accepted that these communities have a role to play; hence the formation, of SAFCEI as noted above. The Christian community has taken on the challenge and various churches are taking part in climate change matters, including water issues.

The notion of climate change has now been accepted as a fact in the various reports, e.g. IPCC (2007, 2018), which has led to exploring climate change mitigation action to remedy this situation that has the potential to destroy the world as we know it. The church, alongside various institutions, has to also play a role in educating communities about the water-related dangers of climate change and how Christians can assume their God-given cultural mandate to protect and care for the earth and nature. Various denominations have decided on actions to be taken and this study will investigate specifically the Roman Catholic Church which may be rated among the most active and structured approach to handling water matters. The role the church

should have played and will be playing in line with the biblical mandate is at the centre of the discussion and will be further investigated. Among the early adopters of this action is also the World Alliance of Reformed Churches (WARC).

During the 24th General Council of the WARC held in 2004 in Accra, Ghana, it adopted the so called Accra confession (WARC, 2016) “based on the theological conviction that economic and environmental injustices of modern day challenged the Reformed family to respond as a matter of faith in the gospel of Jesus Christ to the prevailing injustices”. To affect this statement, the Accra confession was adopted, which challenged Christians to take a stand against the environmental injustices as an integral part of the church’s witness and mission (WARC, 2016). Such a stance was called for due to the incorrect interpretation of Genesis 1:28, which is understood to be commanding humans to have dominion over and subdue the earth. This misinterpretation not only permits but also directs humankind to exploit the earth. The article by an American professor of History, Lynn White, published in 1967 in the *Journal of Science* remains an influential article, which lays accusations at the door of the Judeo-Christian traditions. Titled “The Historical Roots of our Ecological Crisis,” it challenged the dualistic Christian worldview that separates humanity from the rest of nature, which in turn supports the belief that God created nature for man to exploit and to serve human interests. The article suggests that this worldview has been the driving force behind the prevailing aggressive enterprise to dominate and exploit nature. Genesis 1:26–30 is explicitly cited in this regard, and ‘dominion over nature’ is interpreted as permission given by God to mankind to do as they like with creation.

The Christian community must play a significant role to conscientise developing communities and businesses about the need to care for the environment. Organisations such as SAFCEI, the South African Council of Churches (SACC), World Council of Churches (WCC), and many others are involved in various activities to conscientise communities about climate change and related issues. The writings of many contemporary scholars and theologians such as McFague, Eaton, Habel, Conradie, and others affirm the close relationship between ecology and morality. For eco-theologians, eco-feminists, animal-rights activists, deep ecologists and eco-activists, the solutions to environmental problems are not to be found in scientific or technological knowledge or application. What has threatened the environment, they argue, are attitudes that teach disregard for nonhuman species and that look upon the natural world as primarily, or solely, at hand for human exploitation. These views are raised by Kingsley (1995:xvi) as he

made the following comments in reflecting on whether climate change is the responsibility of humanity within the context of creation:

“It is not lack of scientific knowledge, or lack of sophisticated technology that makes environmental problems so difficult to solve; but it is human arrogance or spiritual pride concerning the prime place of the human species in the global ecosystem”.

It is thus important for churches to play an active role both in the creation of awareness and to take the lead in environmental forums in their immediate communities, in order to advance the cultural obligation, which stems from the mandate given to man by God in Genesis 1:26; namely to take care of (stewarding) the environment. Realisation of this mandate encompasses the care of all creation, including fresh water sources. The seriousness of the impact and importance of such care is captured in the statement by Peppard (2014:19):

“fresh water is the substance that constitutes the very baseline of existence. At birth each person is composed of 75% water, and we remain watery for most our lives. Fresh water is condition for existence in cosmic and revolutionary senses, as well as ecological, societal, civilisational and individual terms”.

Water is at the heart of creation and without it, life cannot exist for humans, animals, birds, aquatic creatures and plants. This view is underscored by Peppard (2014:21) who further highlights the importance of water by noting:

“fresh water is essential for every human, society, and ecosystem. There is no substitute for fresh water. But it represents less than 2.5 percent of all available water on earth. Our current rates of freshwater use are unsustainable, even while demand for freshwater use continues to rise”.

This statement is emphasized by Ünver (2009:i) in his foreword to an overview of the World Water Development Report 3, titled *Climate Change and Water*, when he mentions the following:

“Climate change directly affects water the cycle and, through it, the quantity and quality of water resources available to meet human and environmental need. Water supply reliability, health, agriculture, energy shortages, and aquatic ecosystems all will feel the impact of these changes to the water cycle. The demand for water to meet these needs is also affected by climate change”.

Such statements sufficiently illustrate the challenges regarding water quantity and quality as influenced by climate change. These challenges reflect a clear need to take action to remedy the situation, which may become unmanageable, ultimately endangering the ecological system,

including human existence. Added to this, IPCC to date continuously give scientific reports to confirm climate change as an undeniable reality, and that there is a real need to exercise great care in dealing with water issues to ensure that future generations will still have fresh water available and the increasing demand of this scarce resource is met. In support of this course, the initiatives by various ecumenical and multi-faith organisations such as the WCC, SAFCEI, and other faith communities call for caring; tending to the earth and the ecological systems.

However, it is not clear how well the voices of faith communities are articulated in their local contexts. An electronic search of possible publications and activities by local churches in the Emfuleni region did not render any results. This study will, therefore, also endeavour to gather data in this regard.

Given the Christian mandate to tend to creation, as well as apparent difficulty in local faith communities to emphasise and articulate this mandate in their local regions, this study aims to bring the concerns mentioned about water to a grass roots level. The problem relates to the way in which local churches can contribute and engage with communities in ecological and climate change issues, especially concerning water-related matters. These matters can be identified as follows:

- Are there biblical, theological, ethical and scientific bases for the church's involvement in water-related environmental issues?
- How aware are Christian churches in Emfuleni Local Municipality of the current water-related environmental challenges facing their communities?
- How aware are churches in Emfuleni Local Municipality of their cultural mandate towards the water issues?
- Which opportunities are available or can be created for churches in Emfuleni Local Municipality when seeking to play a role in the preservation of their water-related environment?

1.3. The purpose statement of the investigation

The study of water conservation, preservation, and care forms part of environmental issues, because water is the key ingredient in supporting all forms of life. The world is currently faced with climate change manifesting in some instances as scarcity of water in some areas in South Africa. It is for this reason that South African citizens should preserve and conserve water

resources for future supply. The current population growth in South Africa is straining water resources for human consumption, industrial utilisation, and agricultural use. The sewer system is one aspect that needs to be treated well to limit contamination of river water, either through poor water treatment by sewer plants, or water streams that are contaminated by sewer from informal settlements. Residents must take active roles in the forums provided by law to ensure that water resources are preserved and conserved and must hold those responsible to account. The interaction with the environment is regulated by ethical conduct because the outcome of such interaction may affect one or more forms of life.

Section 23 of Bill of Rights in the South African Constitution has classified fresh clean water as a human right and noncompliance becomes an ethical issue; namely the violation of basic human rights. The failure by authorities to comply is punishable by law and is seen as a serious ethical code violation. According to Fedler (2006:3) the study of ethics is best seen as an exploration which opens new discoveries, and thus the journey should be embarked on with a willingness to be transformed and to have assumptions challenged. This investigation is undertaken with the intention to explore environmental ethics relating to the role of the church in Emfuleni. The purpose of this study can be summarised as follows:

- To establish a scientific basis, explore a biblical framework on water, reviewing theological concepts on water, and examining ethical principles related to water.
- To highlight the water-related environmental challenges facing communities in Emfuleni.
- To establish a higher level of awareness among the churches in Emfuleni regarding their cultural mandate towards water-related environmental issues.
- To explore and highlight avenues in which the Emfuleni-based churches can be involved in water-related environmental programs.

1.4. The relevance of the study

According to World Water Assessment Programme (2009:4) the impact of climate change on water will particularly be felt in sub-Saharan Africa where rain fed farming systems are reliant on predictable weather patterns. This report confirmed the work of the Cape Town based researchers Mukeibir and Sparks (2006), who have confirmed South Africa, and especially the Western Cape as water-scarce region. This information has resulted in numerous research projects by various institutions to further understand and plan mitigation of the impact.

Bega (2019) reported on the dangerous pollution in the Vaal River with the e-coli bacteria counts of over a thousand times higher than the 400 counts per 100 ml, which is considered dangerous for human health. Conditions like these affect people who live in these areas and are exposed to polluted water and present a serious health risk to animals and humans. The communities in the environment around buy and slaughter cattle for rituals which may have been depended on contaminated water resulting in serious health risks. This can only be remedied if communities take the responsibility for the quality of water in their immediate environment, and take steps to oppose those who pollute and waste water, both communities and organisations. Unfortunately, the state of water pollution in Emfuleni Local Municipality has reached unprecedented levels due to untreated sewer being released into the Vaal River. The extent of pollution due to untreated sewer being released into the Vaal River has caught the attention of the national government which had to intervene because of the health risk to communities and the violation of Section 23 of the Constitution of the Republic of South Africa.

In the SABC's Health Talk on Environmental Health (2017), it was noted that certain diseases are waterborne such as cholera, parathyroid fever, dysentery, amorbiasis and malaria. It was further stated that 39% of deaths are caused by water. This remains a very high percentage; preventing water pollution should be high on the agenda of South Africa in order to avoid such loss of life.

Water pollution poses a threat to both human life and aquatic life. In the Mail & Guardian, Kings (2018) reported that raw sewer is being released to the Vaal River affecting the ecosystem and killing people, animals and fish which rely on the water. It is such reports that highlights the need for the society and especially the Christian community to be aware of and to take action in protecting nature and creation from being destroyed by humans. Activism of Christians will assist in creating awareness among the communities and also to challenge the perpetrators of such pollution to stop their actions.

The WWAP (2018:2-3) suggested Natural-Based Solutions where natural processes are supported to contribute to the improved management of water. This can be done through conservation and rehabilitation of natural ecosystems and the creation of natural processes in modified or artificial ecosystems. This need for converging approaches provide communities with opportunities to assume active roles in conserving and nurturing water resources, to achieve sustainable food production, and ensure access to water supply and sanitation services.

The communities can in this way contribute towards the mitigation of climate change on water sources. This identified opportunity is at the heart of the research in understanding the church's awareness level in Emfuleni, and to assess its position regarding the threats in order to contribute towards mitigating the impact of climate change.

The following freshwater resources risks were identified:

- Climate change is projected to significantly reduce renewable surface water and ground water resources in most subtropical regions, intensifying competition for water among sectors.
- Climate change is projected to reduce raw water quality and pose risks to drinking water quality even with conventional treatment, due to interacting factors such as: increased temperature, increased sediment, nutrient, pollutant loadings from heavy rainfall, increased concentration of pollutants during droughts and the disruption of treatment facilities during floods.
- Large fractions of both terrestrial and freshwater species face increased extinction risks under projected climate change, especially as climate change interacts with other stressors, such as habitat modification, over exploitation, pollution and invasive species.
- The risk of abrupt and irreversible regional scale change in the composition, structure, and function of terrestrial and freshwater ecosystems, including wetlands has also been identified.

The church, as part of society, especially in the South African context, has tremendous potential to assist in educating and encouraging its members to take an active role in environmental issues. Also, the church can play a significant role in influencing both the government and business sector on what constitutes proper ethical conduct under these circumstances, to warn and provide guidance on how industry and municipalities should conduct themselves on water-related matters. The success of this conduct can be seen when communities are actively and constructively involved in government and business sector projects that potentially affect the environment such as taking part in Environmental Impact Assessments.

Thus, this research can benefit the church as follows:

- It will provide a biblical perspective on environmental matters.

- It will help in developing strategies for the church's involvement in the cultural mandate and ethical matters.
- It will help to equip the church with the required knowledge to be actively involved with the cultural mandate.

Christians are supposed to take the Bible as their source document of how they should live their lives and conduct themselves. In the Bible we read that God has commanded humanity to subdue and take care of the earth (Genesis 1:26- 27; 2:15):

“Then God said, “Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground. So God created mankind in his own image, in the image of God he created them; male and female he created them” and

"The LORD God took the man and put him in the Garden of Eden to work it and take care of it”.

These scriptures commanded humanity to rule like God over all creatures, and to care for them. It is these scriptures that puts the burden on humanity to be the “care takers” of God's creation, so we also take our cue from it to fulfil our God-given cultural mandate. It is aptly stated by Bauckham (2011:3) that this cannot be seen as a mandate for exploitation, but for stewardship where the role of humans in relationship to other creatures is to care and serve on behalf of God, while being fully accountable to God. Bauckham (2011:3) further views creation to have value not for human use only, but in itself, and for God. Humans are obligated to care for creation due to its inherent value. This study will be assessing Christian churches' understanding and application of this command to care for creation.

1.5. The scope and the limitations of the investigation

The study will limit itself to the Roman Catholic churches in the Emfuleni Local Municipality area. The criteria used to select participating churches reflect those with a good historical background of leaders that have focused on environmental care and support over decades. Further details on this matter will be provided in chapter 4.

The Emfuleni Local Municipality plays a central role in the study of water for various reasons. Firstly, Emfuleni is home to Rand Water which is responsible for providing the Gauteng Province with water. Secondly, Gauteng's water is supplied by the Vaal Dam, which is the reservoir for the water of both Gauteng and the Northern Free State. Thirdly, Emfuleni has

several rivers running through it, such as the Vaal River, Klip River and Suikerbos River, as well as many other tributaries. Fourthly, the Emfuleni Local Municipality is highly industrialised with big companies such as ArcelorMittal, South 32 and Dorbyl. Lastly, this municipality also handles the sanitation system for the Sedibeng region, covering Vanderbijlpark, Vereeniging, Heidelberg, Meyerton and surrounding townships. While there are various environmental challenges facing this area, the focus of this study will be limited to water.

1.6. Method of study

Various literature sources such as books, journals and relevant websites will be critically studied and considered alongside biblical principles, in order to determine what is currently known and done with regard to environmental matters and the impact of environmental awareness on the protection of the environment. The biblical principles have been already discussed by many scholars and this research will tap into that knowledge base. To compare this with what is currently being done at grass roots level, a questionnaire was used to gauge the knowledge and insight of church members, both laity and leaders. In obtaining these perceptions of church members the necessary ethical clearance was obtained from a NWU ethics committee and a specific ethics number was generated for this study. In ensuring that the concerns raised are addressed and the purposes of the study are achieved, the process to be followed will be discussed in detail later in this study.

1.7. Chapter division

1.7.1. Chapter 1: Orientation

This chapter deals with matters of introduction, background and the problem statement, purpose, relevance of the study, scope and limitations, and methods of study.

1.7.2. Chapter 2: Literature review: establishing a scientific theoretical basis for water environment, exploring a biblical framework related to water, reviewing theological concepts on water and examining ethical principles related to water.

This chapter will firstly, provide an overview of climate change matters from a scientific perspective. Secondly, water issues and in particular fresh water matters will be contextualised to reflect their interconnectedness with climate change. Thirdly, various biblical perspectives

on the cultural mandate and contributions by ecumenical bodies in this regard will be considered, in order to indicate their contribution to current eco-theology hermeneutics and the interpretation of the Bible from the ecological perspective. Finally, a current theological perspective on what next steps should entail will be given.

1.7.3. Chapter 3: Environmental scan of water-related issues in the Emfuleni Local Municipality

Chapter 3 consists of a brief survey of the contextual and socio-political factors that may influence the community on the water-related environmental pollution in the Emfuleni Local Municipality area.

1.7.4. Chapter 4: Study of churches in the Emfuleni Local Municipality's involvement in water-related environmental issues.

Results of interviews based on questionnaires with church priests and congregants will be discussed.

1.7.5. Chapter 5: Conclusions and Recommendations

Based on the analysis and conclusions, recommendations will be made.

CHAPTER 2: LITERATURE REVIEW: ESTABLISHING A SCIENTIFIC THEORETICAL BASIS FOR WATER ENVIRONMENT, EXPLORING A BIBLICAL FRAMEWORK RELATED TO WATER, REVIEWING THEOLOGICAL CONCEPTS ON WATER AND EXAMINING ETHICAL PRINCIPLES RELATED TO WATER.

2.1. Introduction

This chapter aims to deal with both the first research question and the first purpose statement from chapter 1 respectively. In order to achieve its goal, the chapter is divided into four sections, namely; establishing a scientific theoretical basis for the water environment, exploring a biblical framework related to the subject of water, reviewing some of the theological concepts on water, and examining ethical principles on water.

2.2. Establishing a scientific theoretical basis for water environments

The section discusses the scientific facts about climate change and how climate change affects water resources. On face value it may appear as if climate change is about changes in weather patterns that may not be related to water; however, when learning about the ecosystem and climatology, the impact of climate change on water bodies is clear. The section will not explain the science on the subjects of climate and water cycles in detail; instead, it will provide only the necessary information to equip people with basic understanding of the relevant scientific information. It will further illustrate how humans have tampered with the world's ecological system, which in turn created the crisis of climate change. Finally, this section will address facts about anthropogenic climate change, what climate change is, the impact of climate change, the scientific basis for climate change, and why water is central to climate change.

2.2.1. Scientific facts on anthropogenic climate change/global warming

The impact of human activity on the environment has been debated for many years, from various perspectives including biblical and scientific perspectives. The landmark article by Lynn White (1967) "The Historical Roots of Our Ecological Crisis," which purported Christianity as the most anthropocentric religion, further blamed Christianity for the ecological crisis the world faces. It is this view that spurred the religious community, especially Christianity, to revisit the interpretation of the role of man and the purported support of

industrial development and capitalism by Christians that has been seen as key driver for the destruction of the earth. Debates have continued and the demand for scientific proof by the opponents of Anthropocene climate change resulted in the formation of multidisciplinary teams under the auspices of the IPCC. This included scientists, theologians, and meteorologists who have conducted research from various angles to understand the causal factors of climate change. The 2007 IPCC Technical Summary report (2007:23-28) provided a detailed technical report showing scientific data that was used to come to the conclusion that climate change is a fact and that it is scientifically proven that humans are undoubtedly the major cause of the current climate change. The report, based on the scientific and meteorological data provided, came to the conclusion that “warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level”.

2.2.2. What is climate?

Global warming and climate change are used interchangeably when referring to the changes in the weather patterns and in atmospheric climate. This refers to the increase in the average climate temperature of the world that has happened over many years due to the various interconnected climate systems of the world, including oceans, land, polar icecaps, and the atmosphere and has ultimately resulted in changes in the ecosystem (Scholes *et al.*, 2015:1). The IPCC 2014 synthesis report looked into climate change in detail to give better insights into perceived future climatic and ecological changes that may be the result of this phenomenon. The report covered such impact under the following headings: future climate changes, risks and impacts, future pathways for adaptation, mitigation and sustainable developments, and adaptation and mitigation. It further provides evidence not available in earlier reports by giving proof of various climate changes and of the impact it has on different species in certain regions to further prove that climate change indeed exists and impacts the earth and the ecological system as we know it. The IPCC 2014 synthesis report (2014:35-54) continues to provide the latest information of scientific data and facts to show that human activity continues to be the major factor in climate change. The aim of the report is to provide progressive scientific data and information to further prove humans’ role in the climate change phenomenon. The report closes with the sad factual observation that “Global increases in anthropogenic emissions and climate impacts have occurred, even while mitigation activities have taken place in many parts

of the world”. This is a disturbing realisation of how insensitive humans are to the plight of the planet, even though they have been made aware of their own impact.

The various IPCC reports have confirmed the existence and the impact of the climate change phenomenon, and humanity has to respond appropriately in their own interest and that of the earth because the fate they are facing will destroy both because they exist interdependently. Christians and other faith-based organisations must stand together and fight for a meaningful future of humanity and the earth. Climate change is a reality and Nothwehr (2012:156) correctly stated that “human induced global warming is occurring” and 97% of climate scientists have agreed to the assertion. Nothwehr (2012:157) further emphasised that evidence of global warming is “unequivocal” with indications that the human actions are responsible for the change in climate. Nothwehr (2012:157) further stated that reports from scientists also indicated that the levels of carbon dioxide (CO₂) have risen about a third since preindustrial times indicating that the industrial revolution has been a major contributor to the current climate change phenomenon.

2.2.3. What is the impact of climate change/global warming?

Climate change, as stated above, is a phenomenon taking place in the climate spheres of the earth. Earth’s average temperature is increasing and it is this increase that affects the ecosystem of the world in various ways, including marine life, vegetation, rain patterns, and ecology. This also threatens the livelihood of humans. The impact of climate change is summarised by Maslin (2007:39-55) who sketches a scenario in which climate change will increase the sea level and contribute to flooding in some countries. It will further lead to depletion or extinction of some plant and animal species and affect agriculture as some parts may become uncultivable particularly with crops that are sensitive to temperature and moisture supply.

Other changes that may be caused by climate change include extreme droughts, glaciers and ice caps that will melt and increase the sea level resulting in the sea to encroach on land. High seas may affect properties on beach fronts as waves will extend beyond these. The increase in CO₂ in the atmosphere will decrease the efficiency of the earth’s system to absorb the anthropogenic CO₂, resulting in increased airborne CO₂. This will eventually increase the ocean’s acidification and kill off much of the aquatic life. The 2007 IPCC report (2007:750-752) provides details of various environmental changes that may occur such as increases in hurricane intensities. It further states that global warming will likely increase peak wind

intensities resulting in an increase in the number of storms, precipitation, and wave heights in other regions. Wet countries will be wetter while countries which are prone to drought will be drier. Some diseases will be more prevalent due to the increased heat and moisture resulting from global warming (Horrel *et al.*, 2010:4-6).

South Africa has been identified as one of the countries affected negatively by climate change. This will be manifested through combined impacts on human livelihoods, security, and prosperity (Zietsman, H.L.; Pauw, J.J; Jaarsveld, A.S; &Wessels, K.J. 2011:5). Climate impacts on other countries may have consequences such as drought conditions, flooding, higher average temperature, and changes in rain patterns. These will all result in effects on the ecosystem. Some visible impact on the ecosystem may be seen in the extinction of plant and animal species, aquatic animals and plants and birds that may not be able to adapt to the sudden changes in climate and temperature. One of the impacts of climate change is natural climate variability which results in water limiting pressures on agriculture as well as significant shortages of drinking water due to reduction in rainfall in drier areas. Scientists have reported that South Africa has an average rainfall of 450mm which is half of the world's average rainfall and thus classify the country to be likely affected more by drought events than by heavy flooding (WWF, 2017:8) In 2017, the Western Cape experienced extreme drought which is believed to be related to climate warming and resulted in a scale of water rationing never before known in the history of South Africa. Associated with the reduction of rainwater, food production in the affected areas naturally decreased and this provides challenges to poor communities who must now buy water for drinking and expensive imported food. In the WWF 2017 report, it is recorded that the economy of South Africa has decreased by 0.2%, resulting in 37 000 job losses and adding a further 50 000 people living under the bread line. The country further faced a looming water shortage in 2015 (WWF, 2017:7).

Climate change is believed to have already started and it has a serious economic impact. The situation is expected to get worse, resulting in extreme economic disasters for poor and developing countries such as the Southern African Development Countries. The impact on the economy will exacerbate the disparity between rich and poor in the world and developing countries will be mostly impacted due to weaker sources for adaptive capacity. This has been proven with the recent storm "Idai", which affected Mozambique and North-Eastern Zimbabwe where human lives were lost and homes and infrastructure were destroyed. Butkus and Kolmes (2011:77-78) correctly pointed out that other parts of the world may lose lives due to hunger

and lack of clean, fresh drinking water, thus raising the importance of caring for this important, but scarce resource.

2.2.4. Scientific basis for climate change

The atmosphere has been impacted negatively over the years through pollution caused mainly by the burning of fossil fuels. The discovery in 1985 of the ozone layer depletion over Antarctica has led to a number of international agreements concerning the use of CFCs, which are responsible for the negative impact on the ozone layer (Horrel, 2010:3). This was the result of work done by scientists such as Keeling who began measuring the atmospheric CO₂ levels in 1958. It is believed that, before industrialisation, the CO₂ level was at 280 ppm and now stands at 392 ppm. It is this high concentration of CO₂ that increases the heat because CO₂ allows the solar radiation to reach the earth's surface from the sun but it blocks the infrared radiation from the earth's surface to space (Butkus & Kolmes, 2010:74-76). This is the basis of the scientific proof that indeed climate change has been caused by humans in their quest for development through industrialisation.

Northcott (1996:2) stated that the “single most pervasive and cataclysmic factor in the ecological crisis is that of climate change”. The discovery noted above changed debates from whether human activity is causing global warming, to how should we act to avert and mitigate what are seemingly the enormous negative consequences of climatic change already caused by global warming. The discovery has further cleared the need to reduce CO₂ emissions in order to mitigate the impact of ongoing global warming.

The United Nations IPCC 2018 (2018:6-7) has indicated various scenarios and is limiting climate change to an increase between 1.5 – 2.0 degrees Celsius if the current trends of emissions do not decrease. The impact of global warming remains as per earlier projections; however, the concern remains that reduction of emissions are not visible from the latest reports. The positive statement made in this report is that it is possible to mitigate and slightly reverse some of the negative impacts. The IPCC (2018:25) report concluded this by stating:

“Strengthening the capacities for climate action of national and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support the implementation of ambitious actions implied by limiting global warming to 1.5°C. International cooperation can provide an enabling environment for this to be achieved in all

countries and for all people, in the context of sustainable development. International cooperation is a critical enabler for developing countries and vulnerable regions”.

The time has come for all stakeholders, especially Christians, to use their power of influence among the communities to face this challenge and be active participants in the efforts to save the planet.

The scientific data and results provided until now have demonstrated that climate change has occurred and is a result of human activity on the planet. It is sad that, with the facts and evidence provided, the concomitant action required has not been taken by all stakeholders, including Christians, who have not done much to influence the mind-set and attitudes of both their members and those of businesses, which continue to contribute to climate change. Scientific evidence provided proof that the emission of CO₂ continues to rise despite knowledge indicating anthropogenic climate change. Climate change has started to impact global temperatures, sea levels are rising, glaciers are melting, and the thickness of ice in the Arctic Ocean is reducing due to higher temperatures. Other impacts are increases in storms, floods and extreme droughts. This climate change affects the lives of humans and all creation resulting in a definite impact on the entire ecosystem as predicted by Maslin (2007:39-55) more than a decade ago when he summarised the state of early evidence as follows:

‘The most recent report by the IPCC, shows there is clear evidence for a 0,6-degree Celsius rise in global temperatures and a 7.75% rise in sea level during the twentieth century. There is evidence for a 40% reduction in the thickness of sea ice over the Arctic Ocean. Mountain glaciers are melting at a faster rate ever recorded. There has been a 40% increase in storm activity in the North Atlantic region over the last 50 years and global floods and droughts have become more frequent. In England, the winter of 2000/2001 was the wettest recorded, while the heat wave in 2003 killed at least 35000 people in Europe. The IPCC report predicts that temperatures will rise by up to 5.8 degrees Celsius by the year 2100’.

The above impact of climate change on the ecosystem may lead to the extinction of some animals, marine life, and plants. South Africa seems to be experiencing visible effects of climate change and has experienced both extreme droughts and extreme flooding in 2018/2019 where flooding has destroyed infrastructure and displaced many people in the Eastern Cape and KwaZulu-Natal. The IPCC synthesis report (2014:40-54) describes in great detail how climate changes have been noticed and how such changes have impacted the world ecosystem on various fronts.

The paragraphs above have given a context of the high-level scientific impact that climate change have and may still have on the various parts of the world and our continent, also taking into account that water is at the centre of the impact, whether too much or too little water. The factual scientific reports provided the required evidence, data, and facts which have contributed to the reduction of arguments against the reality of climate change and have been helpful in bringing various stakeholders such as religious bodies and scientists closer together on environmental issues. This partnership has resulted in huge strides being made on the fight against climate change and has assisted humans to assume their cultural mandate of caring for creation.

2.2.5. Water as central to climate change

This study focuses on water-related environmental issues, although the relationship between water and climate may not be immediately evident. The researcher is of the view that most people do not understand the link between climate change and water, and thus attempts to give a basic explanation of how climate change is relevant to water issues. The consideration of water-related issues has to be extended to include climate change, and should receive attention because of the interconnected nature of climate change and water. Water is life and life needs water to survive, be it fresh water or seawater. Even though care for water includes both fresh water and seawater, the significance of fresh water for humans and animals cannot be underestimated. Joseph (2011:60) views water as an ecumenical symbol in that it is the source of survival for all living beings. Care must be taken of anything that may affect water, both in quantity and quality, because a limited supply of water will affect life as a whole. Therefore, climate change was discussed briefly, as it will impact water quantity and quality. It is of the utmost importance that we as humans understand this and become part of the preservation efforts that will have an influence on water.

The IPCC Working Group (2007:6) defines climate change as “any change in climate over time, whether due to natural variability or as a result of human activity”, while the Framework Convention on Climate Change (IPCC 2007:6) defines it as “a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.” The significance of the Framework Convention on Climate Change definition is that it clarifies that human activity alters the composition of the global atmosphere which in turn impacts on the ecological systems when compared to similar periods. It is important to note

that ecosystems are altered by climate change and cannot continue to support creation, which results in the extinction of various species.

Peppard (2014:14) defines ecology as the “study of relationships among living beings, physical entities, and dynamic systems in a given domain or environment”. Butkus and Kolmes (2011:57) rephrased Haeckel’s definition of ecology in the following manner: “By ecology we mean the body of knowledge concerning the economy of nature – the investigation of the total relations of the animal both to its inorganic and its organic environment; including, above all, its friendly and inimical relations with those plants and animals with which it comes directly or indirectly into contact – in a word ecology is a study of all those complex interrelations referred to by Darwin as the conditions of the struggle for existence”.

This may be seen as the study of interconnectedness of life on earth and the interdependence among various elements of God’s creation for co-existing. The definition is important in that it acknowledges that each creature is significant and that the rest of creation is incomplete without it. Global warming disturbs the ecosystem because it changes temperature and may lead to the extinction of some species, and as a result, severe impacts on the ecosystem. The other crisis we face is the pollution of the natural environment by various sources such as mining, manufacturing, agriculture and waste, all of which threaten the livelihood of many. Vayalil (2018:3) views the current situation as an ecological crisis, because the habitats of animals and humans are changing in a manner that destabilises their continued existence. Vayalil (2018:3) further regards the current levels of pollution as a reason for the environmental crisis. The definition of pollution (as cited by Vayalil, 2018:6) is “to make or render unclean, defile, to desecrate, to profane”. Humans have been defiling the environment for many years, and this practice is growing. For the purposes of this study, water pollution is especially relevant, and Vayalil (2018:6) describes it as “an undesirable change in chemicals, which constitutes biological as well as physical pollution”. All forms of pollution affect the quality of life and should be prevented or controlled.

The horrific loss of species is identified in the writings of the philosopher Steven Clark, as cited in (Horrel, 2010:266):

“The rate of species loss is between a thousand and ten thousand times the usual. We do not know – and probably will not know until it is far too late – if too many species are being eliminated for the whole to survive in any form hospitable to us. ‘One planet, one experiment’”.

The ecosystem cannot sustain this continued loss in species without ultimately impacting on human existence. Ecology is central to climate change because the change in climate directly affects the ecological system of the universe in various ways, with water being at the heart of the impact. The following paragraphs look deeper into the significance of water in ecology.

This study focuses on water care and preservation and it is thus important to clarify the relationship between climate change and water. Clinically looking at the study, it may appear that there is no direct link of the water situation in a local community and climate change, and yet water is at the centre of the impact of climate change. This section looks into how water is related to climate change and global warming.

Olcay Ünver (UNESCO, 2009:i), the coordinator of the World Water Assessment Programme, views water as an integral component of climate change and the primary medium through which it exhibits its impact. Ünver (UNESCO, 2018:i) further made the following important statement:

“Climate change directly affects the water cycle and, through it, the quantity and quality of water resources available to meet human and environmental demands. It can lead to both floods and drought. Rising sea levels have a serious effect on coastal aquifers, a major source of urban and regional water supply systems, and higher water temperatures and changes in extremes can exacerbate many forms of water pollution. Water supply reliability, health, agriculture, energy and aquatic ecosystems – all will feel the impact of these changes to the water cycle. The demand for water to meet these needs is also affected by climate change. The importance of water to sustainable social and economic development cannot be underestimated, yet many countries are already facing multiple water challenges, all of them compounded by climate change.”

Ünver further indicates that the impact of climate change to society itself cannot be underestimated, and many countries are already experiencing the impact of climate change. Ünver concludes his foreword by proposing the firm commitment from leaders in government and in private sector to mitigate the impacts of climate change, and act collectively; rise to the challenges of climate change to ensure long-term economic, environmental and social sustainability and avoid a global water crisis. Azar Adeel, as cited by Peppard (2014:115) also states that “climate change is all about water and water is the medium through which climate change will most profoundly affect all societies and ecosystems.”

Water is the one resource that God provided to creation for consumption and existence. In Genesis 2:5-6, God provided water to plants in the form of dew. Plants in turn provided humans

with food. Water is also crucial for animals that need water to survive. It is for this reason that droughts remain dangerous natural phenomena threatening the lives of both animals and plants. Quebert (2010:143) rightly views water as the most important resource without which proper and prosperous life is impossible. Water must hence be conserved, protected and used frugally. Water nourishes crops and the entire ecosystem while regulating our climate through the evaporation cycle. Fresh water is thus continuously provided to sustain life on earth. Humans are water dependant and make extensive use of this indispensable resource and often endow it with powerful religious value such as for baptismal purposes, christening, and purification of life from spiritual perspective, as can be seen in the cleansing rituals of some churches like the Roman Catholic Church, Anglicans, and other Christian denominations. They further argue that access to adequate freshwater resources is essential for human health and development, the improvement of children's health, and education. Water is at the heart of human survival because without clean, fresh water, humans are at risk of poor health and even economic constrain because they would have to buy or purify water for own consumption. Based on the challenges this valuable resource is facing, the United Nations Report on sustainability supports the decision to half the current shortage of fresh water supply to poor communities. Peppard (2012:17), in closing her analysis on water, stated that "fresh water is precisely the sort of substance – indeed, perhaps the substance par excellence – that illuminates the embodied, universal, and contextual character of human and ecosystem existence". Industrial development, which has contributed to the destruction of the earth, also needs water availability to operate. This elevates the significance of water to an unmatched level and importance for any form of life on earth and in general.

In dealing with water challenges, the relationship between climate change and water issues is central to current debates on climate change. Various scientific findings, including the IPCC 2014, alluded to fact that the impact of climate change in the world will be through water. Travis Huxman, as cited by Peppard (2014:129), notes "water is the hammer with which climate change will hit the earth".

This means that the tool for the destruction through which climate change will work is water, hence the relevance of water in all the climate change debates. The involvement of Christians in climate change challenges is directly linked to water issues.

The report of the United Nations Water Assessment Program (UNWAP), "Water in a changing world" (2009), indicates that changes in our water resources are shaped to a great extent by a

number of key externalities, which include climate change, and that the water sector have a tremendous influence on how water resources are used or misused. The report further describes the dynamic linkages that interconnect changes in the climate, the state of our water resources, demographic expansion and migration issues, food and energy shortages, and the continuing challenges of poverty. This clearly shows the intimate relationship that climate has on water and that, in all climate change discussions, water is at the heart of the debates, because climate change directly affects the water cycle and through it, the quality and quantity of water resources available for human and environmental needs. The UNWAP (UNESCO, 2009:9-11) further reported that climate change discussions must focus on water, and also should focus on addressing water drivers without which climate change remain inescapable. This statement corroborates other statements and views on water being at the centre of climate change and that addressing the water challenge would mitigate the impact of climate change. Climate change has an undeniable impact on water through precipitations and evaporation cycles as well as changing patterns of consumption, while in contrast economic developments will increase the demand for water supply (UNESCO, 2009:2). The UN Report on Water states that the issue of water is central to climate change, and that water is viewed as the central point that will impact climate change in the world; a view endorsed by the President of the World Water Council, Mr Braga, when he stated “water is in the heart of global development” (WWC, 2015:3). The WWC President anticipated that water would be a topic at COP21 in Paris during 2015 due to its centrality in climate change discussions. This has confirmed water issues as the greatest challenge of climate change as development depends on water availability. The World Water Council has identified water as a pre-requisite for all development and thus pivotal to the eradication of poverty. Its importance is highlighted in sustaining momentum for the millennium development goals (WWC, 2015). The WWC reported that the impact of climate change is mostly manifested through, with and by water, and has guaranteed that “90% of climate change is manifested through, with and by water”. This statement suggests that climate change cannot be separated from water issues.

The United Nations secretary-general, Mr Ban Ki-Moon, highlighted the importance of water and the role that all stakeholders play in changing and addressing the water challenge when he stated that a “water secure world will require the full engagement of all actors, not least the world of business” (WWC, 2015:9). The importance and significance of water for life remains indispensable, because without it, there is no life on earth. Peppard (2014:17) rightly concluded that “fresh water is sine qua non of human existence”, meaning that water is universal and a

baseline requirement for life to exist on earth. Furthermore, she regarded water as “*sui generis*”, meaning that there is no substitute for fresh water. Finally, Peppard (2014:17) stated that “the water features are universal but are manifested in particular contexts”. Fresh water in particular is at the centre of shaping the lives of people. The challenge we face is that fresh water resources remain finite and that it is a crucial substance for ecosystems, survival of various species, climate change, and life on this planet.

The discussion above attempted to give an understanding of the significance of water for life in this world. It is important to note and understand the role water plays in climate change debates, in order to understand why water remains the central point in these discussions. The greatest challenge facing the world today is that this indispensable resource is decreasing while the demand for it is increasing. The situation should force all humanity, especially Christians, to focus their resources and energies on conserving and protecting this valuable resource. The demand of water in South Africa will make any energy shortage insignificant as the impact of a water shortage will have a huge effect on the well-being of humans and the economy of this country. If this is true, Christians as well as other religious people, political and business entities, and the rest of the world should strive to find a remedy to the water shortage challenge that the world is facing. According to UN WATER Report (Unesco, 2018:v) more than 2 billion people do not have access to fresh water and this number will increase due to the anticipated impact of climate change. Too many people are without water and this situation must be mitigated. This can only be done if the world communities take up the challenge to care for water for the benefit of creation and future generations.

2.3. Exploring a biblical framework related to water

This section will be focusing on what the scriptures says about water, and will identify texts dealing with water in the Bible, and the context in which they occur. In addition, the study will not focus strictly only on water, but also on caring for creation in a broader sense. In Genesis 1:26-28 (which will be discussed in 2.2.1.) God does not enumerate all the responsibilities of humans, but gives generic guidelines that informs the mandate of humans in relation to creation. The generic mandate is informed by this context, and will embody the principles of human interaction with creation as a whole. This section will discuss the cultural mandate for humans, perspectives on the contribution of man’s fall and human behaviour after the fall in relation to caring for creatures, and the significance of water and its various uses and applications in the Bible.

2.3.1. What is the biblical cultural mandate?

The Bible is the basis for a Christian ethos and conduct and it is important to understand what the Bible teaches on caring for the environment, which includes caring for water as indicated above. In the first creation story of the Bible, the book of Genesis 1:26-28 reads:

“**26** Then God said, “Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground.” **27** So God created mankind in his own image, in the image of God he created them; male and female he created them. **28** God blessed them and said to them, “Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground.”

This text is at the heart of the biblical cultural mandate in that God gave humans a mandate to care for and rule over creation in the same way that God does. God could not have asked humans to do something outside their capability, so God gave humans the capability to do these things. However, various interpretations of this mandate have influenced man to assume the role of God as the owner and acted in a way that, in the long run, was not in the interest of God or His creation, but only in man’s own interest. The above verses and how Christians have interpreted them in the past is the basis of Lynn White’s argument against Christianity, i.e. that it is responsible for the destruction of the earth. The critical issue for Christians is introspection to see whether they have understood and interpreted these texts correctly when it comes to climate change issues. It is important to note some key words in the texts above, namely 'image of God' (*imago Dei*), 'rule' and 'subdue'.

It is the view of Bauckham (2011:2-3) that the prevalent interpretation over the years has been that humans represent God in creation and have been given the power to rule and to use creation for their purposes because God has given creation over to humans for their own satisfaction. It is believed that this interpretation has given scientific-technological projects unlimited powers because humans have been authorised by God to exploit nature for their own well-being. The question remains, have these scriptures been correctly understood, interpreted and applied?

What is meant by “creating humans in his own image” and that man should have “dominion” is at the centre of these debates. This is what is known as the cultural mandate of man to care for creation. The researcher holds the view that if this is misunderstood or ignored by humans, the execution thereof is likely to be affected. According to Platinga (2002:31), the word dominion does not have to be taken to mean conquest but must be understood in the sense of

“looking after and caring” as God would have done. Platinga (2002:31) further asserts that the image and likeness should not be understood as physical and gender attributes but rather as the love and care for what God has created, meaning being good stewards of God’s creation. The researcher supports Platinga’s view that this means that we could only be like God when we acted and replicated what God would have done in any situation we find ourselves in, emulating His love and care and not “lording over” but “lording under” God’s model of rule. The Bible further states that man has been charged with the cultural mandate to be fruitful and multiply when filling and subduing the earth. The researcher also believes that God’s creation includes the earth and that it is not limited to it, but agrees with Platinga (2002:31) when he views 'creation' as including other things such as an array of cultural gifts, such as marriage, family, art, language, commerce, and government. When God placed Adam in the garden with various plants, God used water in various forms, including water from the rivers in Eden, to wet the garden for it to be productive and fruitful. This points to the significance of water for creation and its necessity for all living creatures.

Failure to execute the cultural mandate may be ascribed to various reasons. In giving perspective to this, some possible reasons deemed to be contributing to this failure to execute the human assignment from God, have been explored. The aim was to explore whether humans have understood the mandate and/or instruction well, and to investigate whether human behaviour and conduct are the possible reasons why the world is faced with the current climate change situation. The following paragraphs explore the potential reasons that may have contributed to this failure from a biblical perspective.

2.3.2. The biblical significance of water

This study focuses on what the Bible teaches about water. However, not enough theological material was available to enrich the discussion on the subject. In attempting to understand Genesis 1:2 (where water is mentioned for the first time), the Bible itself does not provide a clear message. However, scripture can be better understood with contextualisation from the Mesopotamian mythologies that depicted water as reflecting conflict between good and evil, and the good God winning the battle by bringing order in the midst of chaos. Bradley (2012:1) maintains that water plays a role in the scriptures and stories of various faiths. Further, Bradley (2012:1) observes that the earlier civilisations were settled around areas with water from the Tigris and Euphrates rivers. These earlier civilisations were followed by the Egyptian civilisation, which was built on the banks of the Nile river. This forms the premise for the view

of water in the Old Testament, and to a lesser degree, the New Testament. Bradley (2012:2) summarises the common myths related to water as follows: “Common to all the early myths and stories that seek to explain the origins of the world is the idea that creation arose out of water, rather in the same way that the human foetus is formed and nourished in the maternal waters of the womb.” Bradley (2012:2-3) further notes that in religions such as Islam and Hinduism, water is perceived as the embryo for life. These myths all indicate that life comes from water and depends on water.

In the opening verses of Genesis 1:2, the Bible refers to water as formless and chaotic, but gives no further background to the creation of water. The Bible continues to say that God separated the waters above called the firmament and below the expanse. It is what the Mesopotamian mythologies called the war of the gods, and the dragon in the water (Moses, 2017:62). It is important to note that in these mythologies, water has spiritual significance and is a symbol of power and life. The researcher will investigate the metaphoric and symbolic water uses in the Bible (2.3.2.1 and 2.3.2.2).

Jones (1997:14) defines a symbol as “an object which refers to another object but which demands attention also in its own right, as a presentation”. This means that the symbol has two meanings and applications, in that it represents the actual physical act and the image or metaphor of something that it denotes. Symbols mostly refer to images of the future. Jones (1997:14) further distinguishes between symbols and metaphors by stating that metaphors provide the tenor and vehicle, whereas the symbol presents the vehicle and the reader should discern the tenor.

Lockwood (2015:5-6) holds a similar view to Jones, namely that water is a material agent and sacred symbol that has been used prominently in the Christian community. Lockwood (2015:5-6) further defines the sacred symbol “as anything which manifests a mystical or transcendental spiritual reality in the here and now”. Water can be used as physical material and also as a sacred symbol that symbolises something more than its current application or use. Moses (2017:62) argues that water is used literally and figuratively in the Bible, which is in line with the views already expressed. These views have provided a clearer background that explains how water is used in various passages of the Bible. Water can be used literally as a physical substance, as well as symbolically or metaphorically. The various symbolic and metaphoric applications of water in the Old and New Testaments will be discussed to provide a biblical perspective on use of water.

2.3.2.1. Uses of water in the Old Testament

a) Water as symbol for a creative force, punishment and blessings

The first reference to water in the Bible is in the time before creation was formed, as stated in Genesis 1:2. Caleb (2007:69-70) argues that the creation myth involving water held by the Mesopotamians influenced how water was perceived by the Israelite communities. Moses (2017:69) holds a similar view of the origin of water, and states that the Bible contains the mythical anecdotes which use water to show the conflict between good and evil. Moses (2017:69) further states that the myth considers the separation of water as the result of the outcome of the battle where god tore the body of the dragon of chaos (represented by water) in two, which subsequently became the firmament and the seas. It is this myth that has given the water the symbol of power, because the powerful God has separated the formless elements into the firmament and the water in the world or sea. It is this belief that the powerful God is able to control creation. The presence and absence of water can symbolise a blessing or curse from God for the nation (Leviticus 26; Exodus 28:1.12). In Genesis 1:26, it is evident that the presence of water in the form of the rivers Tigris and Euphrates brought a blessing to creation, because the region became fruitful and flourished because of the presence of water. By contrast, water can also be used to punish the world, as in Genesis 9, when the sinfulness of humans caused God to destroy creation with water. According to Caleb (2007:72), the Israelites were not a seafaring people, and the furious and raging sea symbolised the demonic powers that threatened to destroy. However, God controlled the waters as the manifestation of his power.

b) Water as symbol for cleansing or purity (ritual use of water)

Ritual washing with water entails the physical application of water that is extended beyond the physical or literal action and where some spiritual meaning is linked to the ritual, which normally has other related actions that are performed as part of a ritual. The ritual use of water began with the introduction of the tabernacle where certain rituals were performed for spiritual cleansing. Lawrance (2006:25) states that ritual washing with water includes both people and objects, and that it can be through pouring or sprinkling, rinsing, and cleansing. The mentioned forms of washing are different in execution and use. Lawrance (2006:26) also identified three contexts of ritual uses, namely general washing of impurities which affect people, priestly washing that applied only to priests or Levites, washing for theophany, which is the ritual

washing of the entire people in preparation for the appearance of God or for another public events.

The ritual use of water in the priestly sense is first mentioned in Exodus 29:4, where the priests were washed at their consecration. Numbers 8:7 describes how the Levites were sprinkled. In Exodus 30:18-21, water was poured into the laver of brass to remind them about cleansing when serving God. Though the events were physical, there was spiritual cleansing linked to these physical activities, where physical water also represented spiritual cleansing.

Washing for a theophany and other special events is found in Joshua 3:5, where the Israelites were requested to wash themselves for consecration before crossing the Jordan River, and in Exodus 19:10-15 where the Israelites had to wash themselves because God was going to come down from Sinai to His people.

According to Lawrance (2006:47) general washing in was mandated for circumstances such as leprosy (Leviticus 13-14), menstruating women (Leviticus 15:19-24), childbirth (Leviticus 12:2-8), corpse impurity (Numbers 19), and nocturnal emission (Leviticus 15:16-18). These are events where physical human experience are associated with spiritual impurity, and physical washing with water represented spiritual cleansing. The researcher is of the view that general rituals were more for hygiene purposes than spiritual purposes.

c) Water as A symbol for life

The necessity of water for all forms of life cannot be debated and is accepted by all religions and beliefs. The absence of water in Genesis can be associated with bareness, because creation could not be fruitful without water. Bareness is associated with the absence of life, and this has made water a metaphor or symbol for life. On the journey to Canaan, the Israelites had no water and started murmuring because their lives were threatened. The miraculous provision of water by Moses led them to associate water with life. Kumar (2015:83) justifiably views water as symbol for life as evident through the following sentiment: “Water serves as a symbol of life itself and that at the same time, points to God who is the foundation of all, that is, of life, water and of the human.” Hembron (2011:49) states that water is the essential element for all creation and all lives and vegetation, which again emphasises that existence would not be possible without water. In Psalm 24, the poet also alludes to the ancient cosmology when he says that the earth has been established on water, which creates the impression that water is the home the earth even in an ancient cosmology. Fresh water is an essential element for the survival of

living beings. The presence of water provides creation with life (Job 8:11; Ezk 17:5, Prov 30:16). Fertility of life is linked to the fresh water that is provided (Ps 1:3) when it is stated that trees planted by the river do not wither and they bear fruits in their season.

2.3.2.2. Uses of water in the New Testament

As the symbolic importance of water in the Old Testament has now been established, it is possible to consider the significance of water in the New Testament. The role of water as a symbol for cleansing, rebirth, life and healing will be discussed.

a) Water baptism as a symbol of ritual cleansing and revelation

The symbolic use of water continues in the New Testament, with Jesus at the centre. Jesus's use of water included events such as his baptism by John the Baptist, his healing of various people where water was used as a medium, and the way he described himself as the water of life during His conversation with the Samaritan woman at the well. The New Testament used water symbolically and metaphorically in numerous narratives.

In the New Testament, scriptures do not state the significance of John's water baptism of Jesus, or the other people who he baptised. Jones (1997:51) views John's baptism as a sign and not a symbol, because the water baptism in this instance did not have an intimate relationship with the people who were baptised beyond the baptism itself. Jones (1997:50) stated that neither John nor Jesus made any reference to the significance and value of baptism. However, in Matthew 3:13-15, Jesus viewed the baptism by John to be fulfilling righteousness. The researcher believes that John's baptism was also significant in that it was a sign of righteousness, which contradicts Jones's view that John's baptism was not significant. In the New Testament, water baptism has been sacramentalised, because Jesus ordered that the practice must be ritualised (Matthew 28:19-20). This has established the significance of this ritual within Christian circles. The apostle Paul used baptism more metaphorically to teach the relationship that Christians must have with God and Christ.

The ritual use of water baptism in the Old Testament was not common, and has become very significant in the New Testament, where it is used both symbolically and metaphorically, in contrast with John the Baptist's baptism, which is considered less significant.

In John 1:19-34 and Matthew 3:1-17, John the Baptist performed baptisms in the Jordan River for repentance and the forgiveness of sin when Jesus came to him to be baptised. John introduced Jesus to the audience as “the Lamb of God which takes away the sin of the world”. In this instance, water baptism was the symbol of revelation, and revealed Jesus and his mission to the people. This is further supported by the instance where John the Baptist objected to baptising Jesus, however Jesus compelled John to baptise him (Jesus) to fulfil the law of righteousness. John also revealed a new type of baptism that Jesus will provide, because he will be able to baptise people with the Holy Spirit and fire. In Luke 3:22, the first visible sign of the Holy Spirit descended on Jesus after the water baptism, and the voice was heard from heaven affirming and confirming Jesus as the Son in whom God is well pleased. The researcher believes that the water baptisms of Jesus was approved by Holy Spirit with the manifestation of a dove, and that this introduced a new era of baptism in the Holy Spirit. It was foreseen by John the Baptist, and later experienced by Jesus’s disciples in Acts 2.

b) Water as a symbol and metaphor for rebirth

The concept of rebirth is not used in the Old Testament. It was introduced by Jesus in his discussion with Nicodemus. In John 3:1-7, Jesus meets with Nicodemus at night, and Nicodemus wanted to know who Jesus was. Jesus replied to Nicodemus and said “Verily, truly I tell you, no one can enter the kingdom of God unless they are born of water and the Spirit.” In the text, Jesus tells Nicodemus that he has to be born again, and to be born of the Spirit and of water. This metaphor was not understood by Nicodemus, who asked Jesus what he meant, as the literal meaning was impossible for various reasons. Jesus again tells him to be born of the Spirit and of water, and again Nicodemus did not fully understand this metaphor, because it combined the concepts which were abstract and new for the believers at that time. This symbolic use of water as enabling rebirth is of interest, since water is given the ability to create something new.

Jones (1997:87) aptly states that water ushered in the messianic age at the baptism of Jesus, and also strengthened and bolstered the faith of Jesus’s disciples when they saw and heard what transpired in Jesus’s baptism. Jesus associated water with new birth in the Spirit when he was talking with Nicodemus, and in the words of Jones (1997:86), the importance of water is highlighted, as “water symbolically represented the leap of faith necessary to pass from what one can know or claim for oneself to that which God alone can make possible for those willing to receive all its hiddenness and mystery”.

In his letters, Paul the Apostle used water baptism metaphorically. In Romans 6:3, Paul tells the Romans that those who were baptised in water were also baptised in Christ Jesus and that they were baptised unto his death. Water baptism was used metaphorically for showing that believers in Christ took part in spiritual death just as Christ died physically. Paul further uses the notion of water baptism metaphorically by stating that through water baptism the believers have “put on” or are wearing Christ. Water is used as a grave by Paul when he said that those who were baptised in water, were metaphorically buried with Christ when immersed in water during baptism, and were raised with Christ when they were taken out of water in that practice. Baptism in water was used metaphorically and symbolically by Paul to teach other meanings attached to water baptism. The significance of water in the New Testament cannot be gainsaid, because Jesus’s ministry is better understood in the context of water used both metaphorically and symbolically.

c) Water as a symbol for life – “living waters”

In Judaism, wells are held in high esteem because they have historical significance. In Genesis 29, we read about the well of Jacob, in Genesis 24 about the well of Isaac, and in Exodus 2 we read about Moses finding a wife at the well. Many other events happened at wells, which makes them historically significant and relevant. Jones (1997:109) believes that the connections with wells are also evident in the Torah, in which water is a symbol in the rabbinic tradition, because of its ability to cleanse the faithful, to satisfy the thirst for knowledge, and to promote life.

In John 4, Jesus asked for water from the Samaritan woman who was getting water from the well. The woman was addressing the issues around the drinking water, the value of the well and the prevailing relations between the Jews and the Samaritans. Jesus then responded by showing the woman the water from that well satisfied physical thirst temporarily; however, the water offered by Jesus satisfied deeper spiritual needs. The water that Jesus provides has the ability to end thirst permanently because it becomes the “spring of water welling up to eternal life”. The water that Jesus provides symbolises the new spiritual reality that includes better blessings than those received from wells, hence Jesus called them “living water”, as it was known among the Jewish communities. Through this teaching, water could be seen as symbolising the spiritual teaching of the source of life. This complements and provides a more complete meaning to the words that Jesus spoke to Nicodemus when he told him to be born of water for new life. Jesus ends this discussion by introducing the true worship which can only

happen with the help of the Spirit and in truth. The researcher understands this to mean that water is the symbol for the true spiritual worship that God expects from his people.

Water was used as a symbol of the eternal life and satisfaction that Jesus could provide to those who believed in him. In this instance, water also introduced the new reality, namely that Jesus is indeed the living waters and those that drink from him will thirst no more. In making a comparison, the water that Jesus offers ends thirst forever, and Jesus is the “living water”, which offers freshness and renewal to our lives and spirits.

d) Water as a symbol of healing

Early civilisations believed that water had healing and divine properties. This can be observed throughout the Old Testament. Bradley (2012:23) posits that water has been associated with physical and psychological healing in the cultures of early civilisations. Bradley (2012:23) further mentions that the Babylonian word for physician is “su”, which means one who knows water. This also permeated Greek medical tradition, which held that water provided therapeutic benefits for both bathing and drinking.

The researcher believes that in and of itself, water does not have any healing properties; however, God uses it as a symbol, and even the other spirits use water as a medium for spiritual healing and revelation. The use of water for spiritual practices is practiced by the majority of religions. African traditional healers and practitioners of witchcraft still use water for spiritual purposes in the present day.

Jesus also used water for his first miracle at the wedding in Cana, when he turned water into wine (John 2:1-11). In John (5:1-15; 9:1-12), Jesus healed the invalid man at the pool of Bethesda, who was waiting for healing from the waters of the pool for 38 years. The researcher believes that this miracle was intended to show that healing is from God and not the water of the pool, as people believed. In John 9:1-12, Jesus heals the man who was born blind by making mud with his saliva and smeared it to his eyes, and told the blind man to go and wash at the pool of Siloam. The water from Siloam was used as a symbol and medium for the restoration of sight to the blind man. Jesus used water as a medium of healing. The researcher believes that Jesus’s healing of an invalid at the pool of Bethesda, was to demonstrate that he (Jesus) is the healer and not water which was in contrast to the people who were waiting to receive their healing from the pool of Bethesda.

2.3.3. Biblical perspectives on man's sin and its impact on nature

In caring for creation in a God-like manner, humans should be like Him, meaning they must have His DNA, metaphorically speaking. It is such qualities and characteristics that can help humans to deal with the challenge of climate change that we face, and that will ultimately affect water in some way. Adam and Eve at first ran away and hid themselves from God as they saw themselves naked, and dressed themselves with leaves as a visible change in human conduct. It was at this point that the effects of sin could be identified as the reason why humans changed their view of and attitude towards God, from being His friends to being strangers. The amicable relationship with God changed, and God pronounced a curse on humans, permanently changing the relationship between God and humans. This marked the beginning of a changed human attitude and behaviour towards God. Humans initially did not toil to eat as the earth was taken care of by God who provided. However, after sin, humans were punished with toiling the earth before they could reap benefits from it.

The restoration of the relationship with humans was re-established after God chose the Israelites to be His nation and educated them on how to treat the earth and introduced the Sabbath (Exodus 20:8-10). This teaching on how to handle creation was elaborated when God introduced the Year of Jubilee when the earth and man had to rest for a full year and live from what the earth provided and not what they had sown (Leviticus 25:1-4, 8-10). It was through this Sabbath teaching that God re-established how man should live with creation from the beginning, caring and resting the earth from human activity. It may therefore be assumed that the practice of ignoring the Sabbath may be one of the major factors that has contributed immensely to Anthropocene climate change, because humans are driven by productivity and greed and do not rest for the earth. This is consumerism when human demands and consumption expect the earth to produce every day to meet the increasing demand and greed of humanity

2.4. Reviewing theological concepts on water

The theological perspective looks at the meaning beyond the written word, and also at the context (that is, how it was understood by the initial audience) and the implications for our situation and context today. This entails processes like hermeneutics, which helps the reader to understand the text, and theology, which helps us to understand the meaning of the text. This

section will discuss hermeneutics and eco-theology, the contribution of the Bible and the Exeter Project to hermeneutics, and the theology of sin in the context of creation.

2.4.1. Hermeneutics and eco-theology

Hermeneutics is central to the understanding and interpretation of the scripture. The difference between the two terms “hermeneutics and interpretation” is important to understand because they are mostly taken as synonyms. Hermeneutics assists the Bible reader in understanding the message and the application of the message. This is a systemic process that may be applied in reading all the scriptures in a disciplined manner for second order reflection on the praxis of interpretation. The objective should be to differentiate between acting and reflecting the concrete from the abstract (Conradie, 2010:297). The Bible must be firstly understood from the abstract in order to assume a correct praxis of the Bible texts. This is aptly argued by Conradie (2010:296-298) when he states that hermeneutics is a more theoretical conception; interpretation is practical application of the text whereas hermeneutics can be used in various disciplines, referring to various forms of reading seeking to clarify the confusion around what interpretation entails and to deal with some of the historical distorted communications of messages. Hermeneutics is therefore used when reading texts, which may be particularly obscure in a foreign biblical context.

It is in the advent of the biblical hermeneutics that ecological theology was born when Lynn White stated that Christianity and Judaism should shoulder the blame for interpreting the Bible incorrectly, leading to the destruction of the earth by humans. This challenged various theologians and Bible scholars to revisit their hermeneutics, giving rise to various interpretations of Genesis 1:26-27, i.e. the interpretation of the text to mean caring, and the stewardship role given to humans by God. This was contrary to the interpretation that everything has been given to humans to use for their sole benefit and however they wanted. This is supported by Conradie (2010:297-298) when he views ecological hermeneutics not as a method, but the underlying way the interpreter asks questions and uses ecological sensitivities in the analysis of biblical texts.

Horrell (2010:6) rightly argues that eco-theology places a huge burden on ecological hermeneutics to go beyond what has generally been seen and accepted as the meaning of the biblical texts in order to generate fruitful and broad biblical traditions. He further asserts that hermeneutics plays a key role in reading and understanding the Bible from the perspective of

nature and creation. The advent of contextual theology is an attempt to put into practice what the Bible means today and has challenged present day readers' understanding of the biblical meaning and contributed to the development of among others feminist theology, black theology and eco-theology. Norman Habel and his team of theologians and Bible scholars explored ecological hermeneutics resulting in a ground-breaking work entitled "The Earth Bible Project". The project focused on reading the Bible not with an anthropocentric, patriarchal and androcentric approach, which devalued nature and elevated humans by making them the ultimate in creation who could exploit creation for their own needs (Horrell, 2010:9). Eco-theology can be better understood when the meaning of ecology is understood.

Conradie (2006:13) defines ecology as the scientific disciplines which study the interdependencies between various ecosystems. He further views ecological theology as an attempt to retrieve the ecological wisdom in Christianity as a response to environmental threats and injustices. The researcher believes that the Bible must be understood and interpreted differently in order to understand how God views the ecological systems and their interdependencies. As argued by Lynn White (1967) in his article, Christianity has over many years ignored their God-given mandate and has ignored the voice of nature crying for help from humanity. However, ecological theology is an attempt to hear the cry from creation which is suffering from humans who are destroying what is left in creation on earth. All this is done as an attempt to reinvestigate, rediscover and renew the Christian tradition in light of the challenges posed by the environmental crisis (Conradie, 2006:3). In pursuing this argument, Victus (2014:10) stated that "Eco-Theology speaks about a theology from the perspective of creation, Ecology and human responsibility". This is when the Bible is read to be understood from the perspective of creation and not only from the human perspective as humans and creation are interconnected.

There is a need to hear what God is saying to His creation also regarding the contemporary environmental challenge of climate change, and what He expects from humans who have been given custodianship of creation by Him. Victus (2014:210) rightly places eco-theology in the category of contextual theology which emerges from the desire to understand how God would have reacted when facing the environmental crisis. The scope and span of eco-theology should not be limited to specific regions and countries but must be applied to the entire world. God speaks to His entire creation and irrespective of denomination (Victus, 2014:210), because God is expecting the same conduct and behaviour towards creation from humans in spite of their

different denominations, religious convictions, race, colour, and creed. It is due to this expectation that Conradie (2004:126) argues that the rise of ecological readings of various biblical texts, attests to the fact that texts have been subjected to systematic distortions that have impacted on the understanding and message of such texts. Conradie (2004:126) further viewed ecological hermeneutics to be offering a twofold critique: ‘a Christian critique of the cultural habits underlying ecological destruction, and an ecological critique of Christianity’. This is what makes ecological hermeneutics similar to several other contextual theologies, such as liberation and feminist hermeneutics. The difference is that the text is read, not from the perspective of the poor or women, but with the lens of nature (Habel, 2009:8).

It may seem as if ecological theology is regarded as a next wave of contextual theology alongside liberation theology, black theology, feminist theology and womanist theology and various indigenous theologies in the quest for a theology that can respond to the challenges of our contexts. It further appears that ecological theology offers a Christian critique of the cultural habits underlying ecological destruction and a critique from Christian perspectives.

According to Scott (2003:27), ecology may also be used to describe the interdependencies that exist between social humanity and the physical world. This is taken as the way nature ensures its own continued existence in a particular form.

The insight into hermeneutics is key to interpreting the scriptures from ecological perspectives, and contextual theology has been instrumental in the application of scriptures in a way that finds relevance to our situation today. Eco-theology is the tool that helps in the understanding of a message from creation to us and what a cultural mandate for humans entails, as captured in the book of Genesis. Butkus and Kolmes (2011:1) further provided key considerations for ecological interpretation and identified the following four main elements needed in a contextual theological interpretation, thus applicable to eco-theology namely : a) the gospel message, b) the tradition of the Christian people, c) the culture in which one is engaging in theological reflection and d) the changes occurring in that culture “whether brought about by western technological process or the grass roots struggle for equality, justice and liberation”.

Van Deventer (1996:85-190), in his article “Groen Israel – ekologiese rigtingwysers uit Levitikus 25 :1-7”, raised some important considerations that indicate the preference for a reading strategy that focuses on the text and the historical context. The following

considerations are to be kept in mind when dealing with the hermeneutics of Old Testament texts from ecological perspectives:

- The fact that some argue that the Holy Spirit and not the Bible is the motivator for the so called “green struggle”, consequently biblical texts are not expected to offer insights into ecological principles.
- The use of the Bible can be more dangerous when assuming that every verse has an ecological bearing.
- The context of the biblical text is negated in favour of the ecological context of the reader.
- Nature images are used in unconvincing ways.
- The proof text method is used that disregards the context of the text.
- Application of unrelated ecological matters to sound principles relevant for a particular biblical text.
- Conclusions drawn from a text based on lexical agreement with another text.

It is thus important to always take careful consideration of the above factors raised by Van Deventer in order to ensure a valid approach to the Old Testament for finding ecological principles of a theological nature, where some of these theological principles have a bearing on ecological matters.

2.4.2. The contribution of the Earth Bible project to ecological hermeneutics

Habel and Trudinger (2008:1) have been instrumental in the development of what has become known as ecological hermeneutics. They were the conveners of the Society of Bible Literature Seminar on ecological hermeneutics, resulting in the refinement of hermeneutical processes and a clearer focus on ecological hermeneutics as currently explored by biblical exegetes.

The Earth Bible project led by Habel has made tremendous inputs in building the initial framework of understanding and formulating the hermeneutics of eco-theology in our modern day. Habel, along with other scholars, acknowledged that Western Bible interpreters inherited a long anthropocentric, patriarchal and androcentric approach to the reading of the text that has devalued the earth and continues to influence the way we read the text. This is done by

declaring that humans are also members of the endangered earth community before reading the text, and in dialogue with ancient texts to recognise the earth as subject of the text with which we seek to relate rather than analyse rationally (Habel & Trudinger, 2008:1).

Habel (2009:2-3) raised a fascinating observation which views the text of Genesis 1:26-28 as a “grey text”, meaning that more than one meaning can be derived from this text. The actual meaning remains that of human domination, despite the rising number of interpreters who have found that the Genesis 1 (and similar texts’) mandate to dominate remains the grounds for humans to harness and exploit nature. This highlighted the ambiguity of interpreting this text and thus, one should not deny the message that man is superior and should rule or have dominion over the rest of creation. This has brought the group to review the text and to accept that both interpretations are acceptable and that a mediating interpretation will be the best suited, based on a dual meaning embedded in the text. Habel (2009:2-3) further refers to the three dimensions that make the passage grey:

- The image of God
- The mandate to dominate creatures
- The commission to subdue the earth

Habel then concludes: “The stance on this grey text is quite explicit: humans are created in God’s image so that they may have dominion” (Habel 2009:5). However, the dominion that has been given to humans, should be referenced from the dominion that God had over creation before man was created, in order for humans to execute the dominion that has the love and care for creation which God exercised over creation.

Habel further argues that Psalm 8 may be viewed as the celebration of the dominion and seniority of man over all creation and verses 5-8 are understood in the light of human dominion:

- “You have made them (humanity) a little lower than God and crowned them with glory and honour”. “You have given them dominion over the work of your hands; you have put all things under their feet, all sheep and oxen and all the beasts of the field; the birds of the air and the fish of the sea, whatever passes along the paths of the seas”.

Conradie (2006:71) is of the opinion that ecological hermeneutics, developed within the context of the Earth Bible project may be described as being predominantly a hermeneutics of

suspicion and retrieval, because ecological hermeneutics articulates the suspicion that the biblical texts and their interpretation have been distorted as a result of an anthropocentric bias, which marginalises other creatures and the voice of the earth. He further asserts that the hermeneutics of suspicion would require an ideology-critical analysis of the androcentric distortions at work in the production and the interpretation of biblical texts.

By looking at the story of creation in the Bible, Habel (2009:2-4) noted that things that separate humans from the rest of creation, such as being created in an image whereas other things are born from earth, mean that humans are image modelled. This brought Habel to the conclusion that humans are not in the same class as the rest of creation and that scholars and theologians have avoided recognising the special divine action, which created humans to have the ability to emulate and be in the image of the deity-as-king and viewed as royal representatives of deity. In providing a better understanding to the text, Habel (2009:4) summarised this view as follows:

“Whatever the precise interpretation of the image of God that Church leaders or scholars may have endorsed in the past, it has almost provided a justification for proclaiming the superiority of humans over all other animate or inanimate domains of earth. The image of God clearly separates humans from the rest of nature, gives them status that justifies their claim to be superior beings and, in so doing, devalues the rest of creation”.

The Earth Bible Team set out eco justice principles which were developed over several years in dialogue with other ecologists. The principles formed the basis for the development of ecological hermeneutics to read scriptures in (old and new) interpretative traditions (Habel & Wurst, 2000:24-33):

- The principle of intrinsic worth – the universe, earth and all its components have intrinsic worth.
- The principle of interconnectedness: earth is a community of interconnected living things that are mutually dependent on each other for life and survival.
- The principle of voice: earth is a subject capable of raising its voice in celebration and against injustice.

- The principle of purpose: the universe, earth and all its components, are part of a dynamic design within which each piece has a place and in the overall goal of that design.
- The principle of mutual custodianship: earth is a balanced and diverse domain where possible custodians can function as partners, rather than rulers, to sustain a balanced and diverse earth community.
- The principle of resistance: earth and its components not only suffer from injustices at the hands of humans, but actively resist in the struggle for justice.

This has formed the heart and basis of reading the Bible from an ecological perspective and the above principles have been adopted by other eco-theologians and scholars as valid. This will assist readers to judge themselves, when reading the Bible, whether their understanding has considered these eco justice principles or not.

2.4.3. The contributions of the Exeter Project to ecological hermeneutics

The University of Exeter created a network of different theologians and scholars from all over the world to foster collaboration and interaction across boundaries and fields of specialisation. The team consisted of theologians, some of whom have never had any exposure to eco-theology. The Exeter Project has fostered collaboration among biblical scholars and addressed two concerns that were critical in shaping the understanding of ecological hermeneutics. According to Horrel et al. (2010:9) the two concerns of the project were first, “to bring biblical and theological perspectives into closer dialogue through ecologically orientated and hermeneutically informed reflections of the Bible”. The second concern was “to learn critically from the history of interpretation, recognising that earlier interpreters did not share our ecological concerns and awareness and may indeed have helped to reinforce the anthropocentrism of the theological tradition, but be ready also to find potentially fruitful interpretative perspectives in previous engagements with the biblical text”. The project has however, helped to challenge the anthropocentrism of the mainline Christian theological tradition. This was done by looking at the interpretation of some scriptures cited by evangelicals in order to reconsider the meaning of texts such as Genesis 1:26-28, which resulted in looking at the Bible from an ecological perspective.

The contribution of the Exeter Project, according to Horrel *et al.* (2010:10-11), was firstly to generate a hermeneutical awareness, critically examine the texts, and the readings of texts that

make constructive contributions to eco-theology without pretending that the Bible can straightforwardly be regarded as a “green” text. Secondly, it highlighted the value of historical studies in interpretation, even where that history is ambivalent in its impact and far removed from specific issues of ecological concern. Lastly, to illustrate the potential for ecological hermeneutics to cross boundaries between biblical studies and theology and to bring a diverse range of scholars together in making constructive attempts to address an issue of profound importance.

The contribution has opened the doors for various theologians and researchers to conduct further research on this topic and has challenged Christians to start reading and interpreting the Bible from the perspective of creation as well. This has resulted among others in a better understanding of certain scriptures such as the letter of Paul to the Romans and Colossians, where creation has been personified and is said to be waiting for the day of salvation as it is yearning for its own freedom. This might have inspired other eco-theologians such as Conradie to look deeper into the fall of man, and he has recently asked if the current neglect of creation which has resulted in climate change is not the product of sin.

2.4.4. The theology of sin from the perspective of caring for creation

The Exeter Project and the Earth Bible project have challenged theologians to read and approach the Bible from a creation perspective. Various theologians and scholars such as Norman Habel, Thomas Berry, Ernst Conradie, Sallie McFague, John Haught, Mary Tucker, John Grim, and others have made contributions in positioning and raising the prominence of reading of the Bible from the perspective of earth. Butkus and Kolmes (2011:138) argued that the “flip side to grace is the reality of sin, and no eco-theology of human existence would be complete without an interpretation of sin from an ecological point of view”. They further asserted that it was through human defiance and arrogance that harmony was fractured, resulting in alienation between humans and God, among humans, and between humans and the earth. This was an indication that sin defiles the earth, which is contrary to the former view where sin was focused on individual offences against God and humans. This view further highlighted the significance of nature in the creation landscape and has equalised nature’s significance in relation to humans.

The notion to revisit the sin perspective was given serious attention by the recent and most challenging contribution by Conradie in his book “Redeeming Sin”. The researcher discusses

this perspective in the following paragraphs because it expands the notion of sin which may assist in highlighting the importance of creation care.

Conradie (2017:4) emphasises the role of man in relation to the concept of sin and challenges Christians to revisit the concept of sin within the context of the fall of man in understanding the root causes of environmental destruction. The issue that man has caused the climate change phenomenon is not debated but has been accepted by the majority as reality. What is important now is to understand the root cause of the behaviour in man that has led to this situation. For the purposes of this study, the researcher further investigated what Conradie (2017:11) views as the behaviours visible when a diagnosis of the root cause analysis is done on man's behaviour after sin. He is of the view that Christians tend to capture the root cause of climate change as "sin" within the social diagnostics found in Christian discourse on sin. The original Greek work of sin is *harmatano* which means "an arrow falling short of its target". This definition can be understood in the context that humans fall short when they do not perform at the standard that God has set for them and that they thus commit sin. This meaning of *harmatano* does not differentiate where, what, and how non-performance related to eco-mission is failing to perform as God expected, be it the sin of commission or omission.

Conradie (2017:8-11) approaches the subject with caution but has made challenging contributions by attempting to diagnose the root cause of the current climate change and global warming challenge. The approach is based on the root cause analysis as a tool for social analysis. Furthermore, his focus is on the role of worldviews and religious constructions of reality. Finally, the analysis is then related to a form of social diagnostics formed in the Christian discourse on sin.

Conradie's (2017:14) approach to human sin is based on scrutinising human behaviour and conduct as the result of the fall. Human behaviour before and after the fall are analysed, with the objective of finding causal factors for the differences between these two kinds of behaviour. The two behaviours are then contrasted to determine what could be the motif for humans to constantly move away from the caring and loving behaviours which were received from God before the fall. These behaviours are considered to be the ones that compel humans to act contrary to the behaviours ordained by God, and which were characteristic of human behaviour before sin materialised. Conradie (2017:11-22) identifies these behaviours and diagnoses them as failures or shortcomings, and categorised them as follows: sins of pride, greed, power, and privation of good (*privatio boni*).

Conradie (2017:11-22) referred to sin as moral failure, the tendency not to perform what is expected from us as humans. This can be seen when man changes his behaviour from being the caretaker, to becoming the owner and destroyer of the environment and creation where he also belongs. Conradie (2017:11-22) argues that the destructive conduct of man can be seen in various sinful behaviours such as immorality, worshipping of creation at the expense of worshipping God, as can be seen in Genesis 6, where God had to destroy all life due to man's failure to perform and behave in the manner that God had expected. In Genesis 6, we also read that the sin of man on earth was so great that God regretted having created man and decided to wipe man from the face of the earth. The end result was the destruction of life, except those spared by God's instruction to Noah. Conradie (2017:12-14) further argues that the sin of moral failure is diagnosed as the one factor that has contributed to the current climate change we are experiencing. The human without morals does not care about anything but himself.

Conradie (2017:14-15) asserts that the sin of pride causes humans to be arrogant or proud about what they have and are and this has given rise to anthropocentrism, which focuses only on the life and creation of man and his desires. He continues to argue that status or power, knowledge or virtue is at the heart of this behaviour, including God-given abilities and attributes. Conradie (2017:14-15) sees this as the sin that has made man to see himself as the epitome of creation and that all creation has been created for him and his pleasure, prompting humans to misunderstand the "imago Dei" and interpreting it as that humans is God's equal. Hence man was instructed to give names to all animals because he assumed the ownership role resulting in the use and abuse of creation for selfish gains. Conradie concluded that in the presence of this sin, man will do nothing for God's glory.

In focusing on the sin of greed and avarice, Conradie (2017:17-18) strongly argues that this sin has driven humans to desire all the good things for himself even if value will never be derived from the commodity. Conradie (2017:18) has aptly captured the power of sin when he says "Greed is the rapacious craving for more goods or wealth than one needs or deserves" and manifests itself as "excessive desire for acquiring possessions, the desire for hoarding money and the closely related vice of covetousness, which includes the desire for the possessions of others". The researcher believes that humans will have to consume some things for survival, however, over consumption of goods leads to greed. Conradie (2017:18) also notes that consumption in moderation cannot be seen as sin or greed, but satisfaction of basic needs; however, greed can be reflected in sexual lust, hoarding and amassing wealth and riches,

overeating and lack of temperance. Conradie (2017:18) further argues that the consumerism attitude that has been developed and promoted by greedy capitalists that encourages people to acquire and possess things that they do need, has resulted in higher demands from the earth to produce enough to satisfy the greed of humanity. Conradie rightly concludes that the results of high production are the increase in manufacturing and pollution due to higher production and consumption of products.

Conradie (2017:19) describes the sin of power in terms of domination, violence and oppression of those around us, which has manifested in anger and aggression in various forms such as rape, murder, slavery, and verbal aggression as the outlet power one may possess. In South Africa, this has been manifested through the apartheid system of the Government and male dominance where women were subjects of men. Conradie (2017:19) defines power as “systems of control and cultures of deceit to maintain and justify such unjust power”, which may also be manifested in institutionalised structures of society through political and cultural systems. The researcher identifies one such example as the toxic masculinity which views men as superior to women and acts of violence being perpetrated against women to force them to submit to dominion by men. In addition, Conradie (2017:19) also identifies “slow violence” which means violence against people, animals, and the environment that often remains imperceptible because it is attractive, incremental and dispersed.

Lastly, Conradie (2017:19) views the sin of privation of the good and the distortion of relationships to describe a sense of alienation from the means of production and from the products of one’s own labour and the alienation between workers and management. The current world is based on alienation and is protected by statutes such as who is allowed and licenced to do what, thus alienating others from available opportunities. Humans alienate themselves from the earth in dissociating themselves from it in how they treat and relate to it, while regarding their destination as in heaven and not on earth. Conradie (2017:19) regards this alienation as the root cause that has made humans not to care for the earth because they are not affected by the quality of life for the earth. He further argues that the alienation of humans from the rest of creation and the earth community has preoccupied humans with otherworldliness which never encourages a sense of belonging to the earth. This alienation from earth has contributed immensely to the current degradation and destruction of the world, and the current climate change phenomenon, because humans do not share a final destination with the earth.

2.5. Examining ethical principles related to water

This section will consider how the Christian Church should change her attitude in order to play a meaningful role in educating and influencing communities to care for creation, and specifically water resources. It is critical for Christians to provide an alternative approach to caring for creation by the manner in which they view and treat creation. Churches and faith-based organisation are usually respected, and should provide alternative perspectives on how to treat the environment in order to influence attitudes and mind-sets, and to reduce or minimise the degradation of the environment in the various strata of the community, government, and business. The section will further look into educating the members of the Christian Church to be active eco-missionaries who preach the gospel that teaches and encourages people to care, protect, and preserve creation and nature.

In the previous section the importance of fresh water resources was discussed and that this valuable resource has been affected by climate change, resulting in the loss and extinction of various species. Without water, air and soil, creation cannot exist. These three resources are unfortunately affected by humans through pollution, waste, and abuse which eventually will influence and affect the entire ecosystem and ultimately human existence on the earth. As these key resources are critical for life on earth, it is important that Christians must play the role that God has given them in order to keep creation to what God's purpose with it was, especially in preserving and caring for water resources. As earlier indicated humans are destroying creation, but it should be the same humans who protect and preserve creation in a manner that will minimise the damage already caused to creation. The technology that humans need and desire requires water in the production processes. It is for this reason that humans should minimise their impact drastically by using different technologies and reducing waste caused by unnecessary human consumption.

Globalisation has increased and diversified demands for products resulting in high natural resource demands due to consumerism and the growing population. According to Peppard (2014:23) population growth and increase in economic development are major contributing factors to the increased demand for water resources, complemented by the increase in the standard of living. The increase in the standard of living adds to the demand on water resources. The estimates indicate that the freshwater demand has increased in recent times by 64 billion cubic metres per year (Peppard, 2014:23). The profit motif is also included in the depletion of the natural resources in that more people can afford to buy drinks and bottled water due to the

increase in living standards. Mahatma Ghandi's quote that "The world has enough for everyone's needs, but not everyone's greed" is a caution against the extreme desire of humans driven by greed and wealth. Resources such as water are basic requirements for livelihood in general and have to be protected against people who are driven by greed and wealth. Failure to protect water resources will result in greediness; selling at a profit a basic resource like water which is a basic life requirement. Countries that are classified as arid or semiarid regions will be at the greatest risk. This includes South Africa. Peppard (2014:31) quoted UN estimates which stated that "by 2025, 180 million people will be living in countries or regions with absolute water scarcity, and two thirds of the world population could be under stress conditions". Taking the above classification of South Africa in the world as a water-scarce region into account it is important for the country to preserve, protect and utilise water wisely, and minimise the impact of pollution and abuse of this resource to ensure future availability to next generations.

South Africa has various sources of water pollution such as manufacturing industries, mines, agriculture, municipalities, and communities. During the manufacturing processes of goods for human consumption, significant water resources become polluted and this water finds its way to streams. It is such practices that require the communities to be alert and conscious, and raise objections to practices that pollute the rivers in our environment. The communities must be advocates and activists for the protection, rather than the abuse and misuse of these resources by the companies. Finally, another water user that is a major consumer is agriculture, which unfortunately, also contributes to water pollution when using pesticides in the production of food as the residue of these pesticides finds a way to the streams and rivers during rainy seasons.

2.5.1. Transforming Christian attitudes on environmental matters

The challenge we face today is to have the Christian Church leading communities in word and deed. This challenge leads us to Christian praxis, which is a way of doing theology. Vayalil (2018:158) cited Gustavo Guitierrez's definition of theology as "critical reflection on Christian praxis in the light of the Word". This implies that Christian praxis should be in line with what the Bible teaches, and should be informed by the socio-political history. Paulo Freire as cited by Vayalil (2018:158) described praxis "as the process of reflection and action upon the world in order to transform it". Vayalil (2018:158) argues that this should be helping to discover the

truth of a historical situation by participation in the liberation struggle of the people. Vayalil (2018:158) has simplified this concept, as explained below:

‘It is a reflection from a point of departure in the concrete historical praxis of humans. It seeks to understand the faith from within this historical praxis and from within the manner of living the faith in revolutionary commitment. As a result, theology comes after involvement. Liberation theology is the second act. Hence its themes are the great themes of all true theology, but its focus, its manner of approaching them, is different. It has a different relationship with historical praxis’.

In Romans 12:1-2, the apostle Paul, when urging the Roman Church to transform and change its behaviour in order to be good missionaries of the gospel, says: “Therefore, I urge you, brothers and sisters, in view of God’s mercy, to offer your bodies as a living sacrifice, holy and pleasing to God—this is your true and proper worship. Do not conform to the pattern of this world, but be transformed by the renewing of your mind. Then you will be able to test and approve what God’s will is, His good, pleasing and perfect will”.

This seems to assume that Christians were adopting the practices of non-believers and losing sight of their calling to be God’s representatives by living in the light of God’s perspective. The Christian Church should be thinking differently about various aspects of life, such as consumerism, greed, lust, desire for money and wealth at the expense of the poor, as well as godly practices such as caring for the poor. The researcher is of the view that this scripture is relevant to the Christian Church today when human activity is destroying the world through climate change. According to Barram (2018:9), various attempts by humans to transform have failed. He also makes reference to the history of the Christian Church on this matter. However, in the text above, he understands Paul to be “urging – indeed instructing – the Roman Christians to allow themselves to be transformed by God. Again, the power for transformation will not come from them, but from God whom they serve”.

The Christian Church has the obligation to mobilise society and the responsibility to give life; failure to give people knowledge will lead to destruction, as described in Hosea 4:6: “my people are destroyed from lack of knowledge. Because you have rejected knowledge, I also reject you as my priests; because you have ignored the law of your God, I also will ignore your children.” Humanity and the earth are facing destruction, unless Christian churches take up their role and teach people about caring for the earth and its resources.

Christians should be taking their ethos and praxis from the Bible and use the biblical principles as their yardstick for daily conduct with regard to life and the environment. Barram (2018:11) makes the convincing argument that “families, cultures, experiences, and such factors are not to be the primary shapers of who the Roman Christians are, how they think, or how they conduct themselves. Rather, they are to be formed, first and finally by Christ.” This statement applies to the Christian Church if they are to be respected and followed, because people will realise that their values and principles are based on biblical teachings, and are protecting nature and creation.

If the environment has to be protected, the Church must be in the forefront of this campaign because of the influence the churches and other religious groups still have on moulding the practices and conduct of communities. This is precisely the reason why Lynn White blamed the Church for the destruction of the world through industrialisation, because he regarded Christianity and Judaism to have blessed the behaviour of industrialists. As noted above, it was through this article that the Church was challenged to revisit their stance on environmental degradation in the teachings of Christianity and Judaism. The Carson book *The Silent Spring* of 1960 did not create the excitement which was caused by the later article of White which identified Christians and Judaism as guilty parties in not speaking against the degradation of the environment. However, in *The Silent Spring*, Carson (2002:2-3) laments the change in farm life during spring, and the absence of some animal species and of birds particularly: they were going extinct due to the use of the pesticide DDT. She observed a high mortality rate among farm children, and the disappearance of bees for pollination, all of which were caused by the use of DDT. Carson summed up the observation by stating the following:

‘There was a strange stillness. The birds, for example where had they gone? Many people spoke of them, puzzled and disturbed. The feeding stations in the backyards were deserted. The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices there was now no sound; only silence lay over the fields and woods and marsh’.

The article was met with the serious challenge by the manufacturers, but in the end Carson was vindicated when it was found by the United States government that indeed the chemical DDT was harming life as a whole. The irony is that Christians and other religious bodies remained silent and did nothing about the destruction of creation by businesses, while the government, which failed to protect life, creatures and creation, benefitted through taxes. It is in such

instances that Christians and the religious community as a whole are expected to act ethically, in line with their scriptures, and to be the stewards of God's creation, as has been instructed from creation. Had they acted then, maybe the destruction of creation and the earth may not have reached such alarming proportions. According to Winright (2011:5), ethics is seen as the study of morality which asks questions such as what sort of persons we are or have become. Conradie (2010:295) aptly asserts that ecological theology/hermeneutics can be taken as an attempt to retrieve the ecological wisdom from the biblical traditions in responding to the ecological crisis to reinvestigate, rediscover and renew Christian traditions and praxis in light of ecological challenges. The Church can only realise its cultural mandate to care for creation when the scriptures are read from an eco-theological perspective. The Church that ignores this eco-theology perspective is likely not to take serious its role as protector from environmental degradation, as seen from a biblical perspective.

2.5.2. The power of influence that Christians possess

Over the decades, the Christian Church has used various vehicles to share the good news of the gospel. The vehicles used are always relevant to the plight that humanity is facing from time to time. In countries ravaged with wars and natural disasters, the Church uses NGOs to provide food, shelter and clothing for the affected people as part of their mission to share the love and care that God has for humanity. In countries that have faced serious health challenges such as malaria, ebola, AIDS, and many others, the Church has acted jointly to continue their mission by educating and actively helping the communities to conquer their challenges. A good example is when the churches, through faith-based organisations, took an active role in fighting the scourge of AIDS in South Africa. The churches, in partnership with other faith-based organisations, mobilised funds and resources to educate and conducted voluntary counselling and testing in communities to encourage people to obtain knowledge about their status on HIV/AIDS. Various churches actively distributed pamphlets and opened up churches as centres where the NGOs could erect tents to encourage people to know their status as well as supported people who came out to de-stigmatise HIV/AIDS to the level where people accepted their status, which in turn made the treatment of the disease much easier. The above discussion showed the capacity and potential that the Church has to influence change by taking part in social matters that affect society. In the same manner, Christians can take part in water and environmental matters in society with better results.

This is line with the view held by Vodo (2016:16), when he conducted a study to evaluate the impact of some key faith-based organisations (FBO) across the European Member states. It can be seen that the Church as a faith-based organisation can play a significant role in taking part to bring about consciousness among people to the plight of the earth, which is caused by humans. The researcher is of the view that the Christian Church must equally use the power of influence that Vodo has discovered in his research to influence the communities, countries, and ultimately the world in combating the destruction of the earth and the creation of benefits for humans and creation at large. The Christian Church should learn and apply strategies similar to those that organisations have used to combat poverty, expression of exclusions, and social distress across Europe (Vodo, 2016:5). The Christian Church and other faith-based organisations have no reason not to be involved in water and environmental matters as their grassroots influence is unmatched compared to most other organisations.

2.5.3. The eco-mission and Christian obligations

The concept of mission is common and refers mainly to take the gospel of Jesus to the un-Churched, with the sole purpose to introduce them to the saving grace of God through His son Jesus Christ. This is commonly known as the Great Commission and is based on Mathew 28:28-89 where Jesus commanded His disciples to carry the message of salvation to the world.

Ayre (2014:142) views mission as flowing from the nature and theology of the Church, implying that in the mission of reconciliation and renewal of creation God involves the Church as the instrument for God's purposes. He continues that missions have significant implications for caring for creation and for theological reflection on the praxis of eco-mission.

However, Habel as cited in Ayre (2014:144), identified the above as the first mission, where the focus is on "saving souls" without taking the circumstances in which they find themselves into consideration. The second known mission, which Habel identified, is when humans are rescued as part of a community where the spiritual implications are extended to the total human situation in all physical, social and political aspects. This means that the second mission included the first mission. Habel, as quoted in Ayre (2014:144), suggested that the mission of the Church can be viewed in three phases. Firstly, missions can be confined to evangelism which focuses on saving the soul. Secondly, missions are spiritually focused which includes saving humans as part of the community. Thirdly, he identifies eco-mission, which focuses on man who cares for creation. Habel, as cited in Ayre (2014:144), summarises the objective of

eco-mission as “saving, redeeming, restoring, liberating, or healing the earth” in line with the purpose of God, which is to save the world. Jesus was brought to this world as a whole as Saviour and not only for people as it is commonly believed. Shenk, as cited by Ayre (2011:144), further viewed “God’s redemptive mission” as a mystery and the good news of the reign of God.

The researcher is of the view that the mission of God may also be understood in the context of the Lord’s prayer, as indicated in Mathew 6:10: “Let your will done on earth as it is done in heaven” meaning that humanity must live to do the will of God daily by treating creation in the manner that reflects the will of God. This prayer implies that God has mandated humans to look after his creation and in the words of this prayer, humanity has been given the assignment to live according to the will of God and not our own wills.

In pursuing the mission of the Church, Conradie (2011:15) suggested that the Church can play an important role in ensuring that the environmental ethos is developed by Christians and other faith-based organisation within communities. Conradie viewed the formation of the South African Faith Communities Institute as a step forward in creating a platform for churches to foster an environmental ethos among her immediate communities. This argument is further supported by Jacklyn Cocke, as quoted by Conradie (2011:15), when she argues that the Church should be a leader of communities, citing the following reasons to support her argument:

- The Church in South Africa has organised space at grass roots level to promote mass environmental awareness.
- It has the necessary leadership for moral transformation.
- A holistic, ecological vision has deep roots in the Christian tradition.

The above arguments are complemented by various resources that are at the disposal of the Church such as staff, institutions, agencies, networks, buildings and infrastructure to address environmental challenges. In most communities, the churches and religious organisations enjoy the trust of communities which places them at the advantage of influencing the conduct and behaviour of communities within which they operate. The researcher agrees with the conclusion by Conradie that the Church remains the largest and most influential organisation in the country and if this influence is used correctly, society will become aware and will be

influenced to care for creation. Conradie (2011:16) also cites the levels at which Christians can respond to environmental issues, some of which are expanded below: The ecology and eco-mission cannot succeed in their mission to raise awareness and influence behaviour unless there is a cross functional approach as applied by the United Nations to get to where we are on the global warming subject. It is imperative for the churches to seek collaboration with other role players such as politicians, business people, academics, scientists, meteorologists and other governmental and NGOs in educating communities about the significance of caring for creation; especially for water as the most important resource without which life is almost impossible. It is clear that there is a need to have continued dialogue between theology and various sciences, especially environmental sciences, in order to act decisively in dealing with the current ecological challenges. This can be the response to the question that Butkus and Kolmes (2011:5) asked in attempting to find a solution to the challenges that the earth is facing on various fronts: from global warming, scarcity of water resources and sustainability of technological advancement required by modern day living. Butkus and Kolmes (2011: 24) concluded that the solution to the current climate change cannot be found in one player but in multidisciplinary, interdisciplinary and trans-disciplinary approaches in dealing with the challenges that the earth community is facing. From the Christian and Church perspectives, the community leaders must prioritise the issues of eco-theology in their conferences and teachings. Christians must increase initiatives related to inter-religious dialogue on the environmental and ecological issues.

2.6. Conclusion

First, this chapter established a scientifically grounded theoretical basis for climate change by referring to scientific findings by multidisciplinary teams of the IPCC. This indicated that climate change is as a result of anthropocentrism. Scientific information was provided to give a basic understanding which showed that climate change is in fact a reality and that it will have an impact on ecosystems, life, and creation itself. Climate change was briefly defined and explained, and the context and science that explain why water is at the centre of climate change, that it is in fact the hammer with which climate change hits the environment and creation as whole, were discussed.

Second, the chapter studied the Bible's cultural mandate to understand the role that humans were supposed to play in the Garden of Eden before they fell into sin. This was to position the role of humans as God intended, and it was found that God intended humans mainly to be

stewards and look after creation the way He would. In line with the objective of the study, the biblical significance of water was highlighted from selected texts in both the Old and New Testaments in order to understand how God has ordained water to be used. The significance of water for all creation, and how it was used for good and bad as God chose, were considered. One major observation is that water was provided freely for the well-being of creation. The biblical perspective of man's sin and its impact on nature was discussed, where it was seen that God re-established the purpose of man with the calling of Israel as His people by teaching and guiding humans how to interact with each other and the rest of His creation.

Third, the chapter reviewed some of the theological concepts related to water from the perspectives of eco-theology and hermeneutics, which give a practical application to what we have learned from the Bible. The essence of theology was studied in order to inform our ethos and practices with regard to nature and caring for the earth as a whole. The study also looked into the contribution of the Earth Bible Project and Exeter Project to the current interpretation of the Bible through the lens of nature and creation, in order to fully appreciate the Bible's message with reference to creation as whole. This chapter also discussed the theology of sin from the context of caring for creation. This provided the tools to understand what motivates us to do or behave in a manner that moves us away from God due to the nature of sin in us.

Fourth, the chapter examined some ethical principles related to water. As indicated earlier, good theology motivates people to change their behaviour, values, and conduct. In examining these ethics, we looked into some of the unethical historical behaviours, where Christians did not act in line with their cultural mandate and turned a blind eye to the destruction of the earth, mostly at the hand of greedy, powerful people who exploited the poor and powerless. This can be prevented only when the Christian Church can transform its attitude on the environment and creation. Christian churches were also challenged to use their power of influence, which has been acknowledged by other groupings such as politicians and businesses, but which they do not use to be messengers for the good news of caring for creation.

Finally, members of the Christian Church are challenged to go out and be eco-missionaries who spread the gospel of caring and restoring creation to its former glory, because Christ also redeemed creation when he died on the cross. The pending disaster of climate change and the degradation and destruction of the earth can be reversed if Christians assume their ethical role and become community changers for the restoration of creation.

CHAPTER 3: ENVIRONMENTAL AND SOCIO-POLITICAL SCAN OF EMFULENI LOCAL MUNICIPALITY

3.1. Introduction

This chapter focuses on the region of the Emfuleni Local Municipality (ELM) as the context in which the church must function and exert its influence. With the advent of democracy in South Africa in 1994, ELM was created as a part of a redrawing of municipal boundaries. The area is also known as the Vaal Triangle and initially included Meyerton. The history of ELM is embedded in the history of the Vaal Triangle and therefore this history is discussed briefly, in order to give the context of ELM. The broader context of the Vaal Triangle is relevant, because the towns in this area are geographically, economically and socially intertwined – although not all towns in the area known as the Vaal Triangle fall under the jurisdiction of ELM. For this reason, these towns (such as Sasolburg) may also be included in the discussion. The discussion includes aspects such as population growth, economic realities, educational levels, church communities, river conditions, environmental activism and the statutory requirements of the municipality. These aspects may influence the type of ministries of the churches in the area, as well as their participation in social matters. The influence may be reflected in some church aspects such as the inner life of the church, its worship, liturgy, doctrine, and mission.

3.2. The early history of the Vaal Triangle

Mohapi (2009:111) sketches the interesting history of the origin of the Vaal Triangle, and explains that the origin of the African name for the Vaal, “Lekoa”, was given to the area by the Basotho, because they saw their country as stretching “that far”, or “le koa”. For this reason, the Sesotho name of the Vaal River is “Lekoa” to give the understanding that the river creates the border of their country Lesotho that is “that far” hence “le koa”. The area is known as the industrial hub of South Africa due to the large number of industries that developed in the area as a result of the availability of water from the Vaal River and the Vaal Dam.

The Vaal Triangle is a beautiful area with a warm climate, and the Vaal River and Vaal Dam contribute to the area’s popularity through their potential for water sport and recreation in Gauteng. The popular Emerald Casino and the Vaal Triangle Campus of the North-West University are also situated on the banks of the Vaal River. The river is a source of employment

to many people in the area. The Vaal Triangle is also home to Rand Water, which serves various customers including metropolitan municipalities, local municipalities, mines and industries. Randwater stations, abstract, purify and pump 98% (± 4320 Mℓ/d in 2016/17) of the total water supplied through the Rand Water Network. (Randwater, 2019). Rand Water has adopted the South African National Drinking Water Standard (SANS) 241:2015 as delivery specification. In addition, the organisation has a more comprehensive and stringent internal production specification, designed to provide a buffer and ensure the SANS 241:2015 specifications, and benchmarks quality water supplied to local authorities against the World Health Organization drinking water quality guidelines. This has ranked South Africa high in terms of the quality of tap drinking water in the world.

3.3. Emfuleni Local Municipality

According to the ELM integrated development plan (IDP) report (2017/18:1), the Emfuleni Local Municipality is one of three local municipalities that constitute the Sedibeng District Municipality. It is the westernmost local municipality of the district, which covers the entire southern area of the Gauteng Province. It extends along a 120 km axis from east to west, covering an area of 987.45 square kilometres. The municipality has two main city centres, namely Vereeniging and Vanderbijlpark. It forms the “heartland” of the Vaal Triangle, which is renowned for its contribution to the iron and steel industry in South Africa. It contains six large townships: Evaton, Sebokeng, Sharpeville, Boipatong, Bophelong and Tshepiso.

ELM occupies a prominent position in South African history – significant events occurred during the decades spanning from 1910 to 1990. It is in this timespan that events such as the Sharpeville (1960) and Boipatong (1992) massacres occurred. In addition to its prominent historical role, the area is also of geographical interest. The Klip and Suikerbos rivers flow into the Vaal River at Vereeniging, giving the name “Three Rivers” to this part of Vereeniging. Rand Water, which supplies water to Gauteng and the Northern Free State, also established their water treatment plant in ELM. This water treatment plant provides clean water to Meyerton, Vereeniging, Vanderbijlpark, Sasolburg, Sebokeng, Bophelong, Boipatong, Sharpeville, Evaton, Bonane, Deneysville and others. This plant has acquired one of the highest accreditation statuses, the “Blue Ribbon”, which means their water is safe for human drinking, and this feat, in turn, has put the country on the world map (ELM Annual Report (2016/17:1).

3.4. Population

Figure 3.1 represents the population distribution of ELM. According to the graph shown in figure 1, the African population has increased significantly, from 553 307 residents in 2001 to 616 095 in 2011. At 11.3%, it is the highest growth out of all the population groups. The second most populous group is the white residents, and this group shows a decrease from 92 213 residents in 2001 to 86 948 in 2011, which translates into a decrease of 6%. The population of coloured residents in the municipality has increased by 19%—from 7 011 residents in 2001 to 8 356 in 2011. Lastly, the Indian/Asian population is the smallest group, and increased from 5 891 residents in 2001 to 7 078 in 2011, which translates into 20% growth.

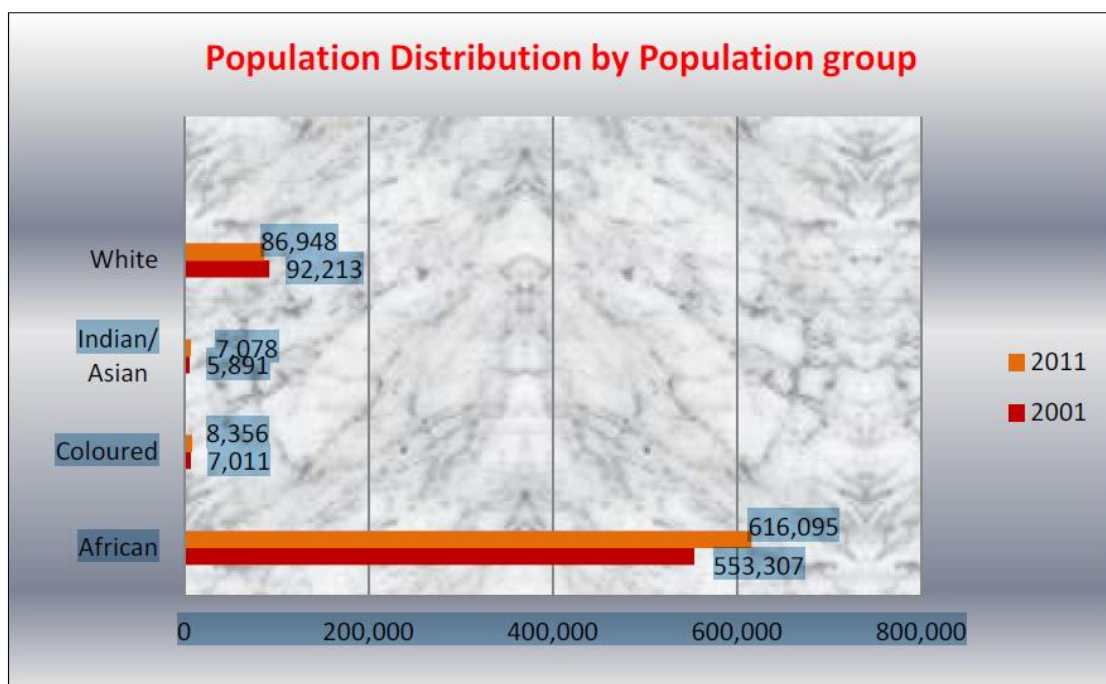


Figure 3.1: Population distribution of ELM according to 2011 data (source: Statistics South Africa –2012/13).

3.5. Level of education

Figure 3.2 indicates the low level of education among the residents in the municipality. The impact of these low levels of education has a direct bearing on the effective participation by civil society in various forums. This is something that warrants further research, in order to fully understand the extent of the impact of the level of education on effective participation in matters relating to water quality and pollution.

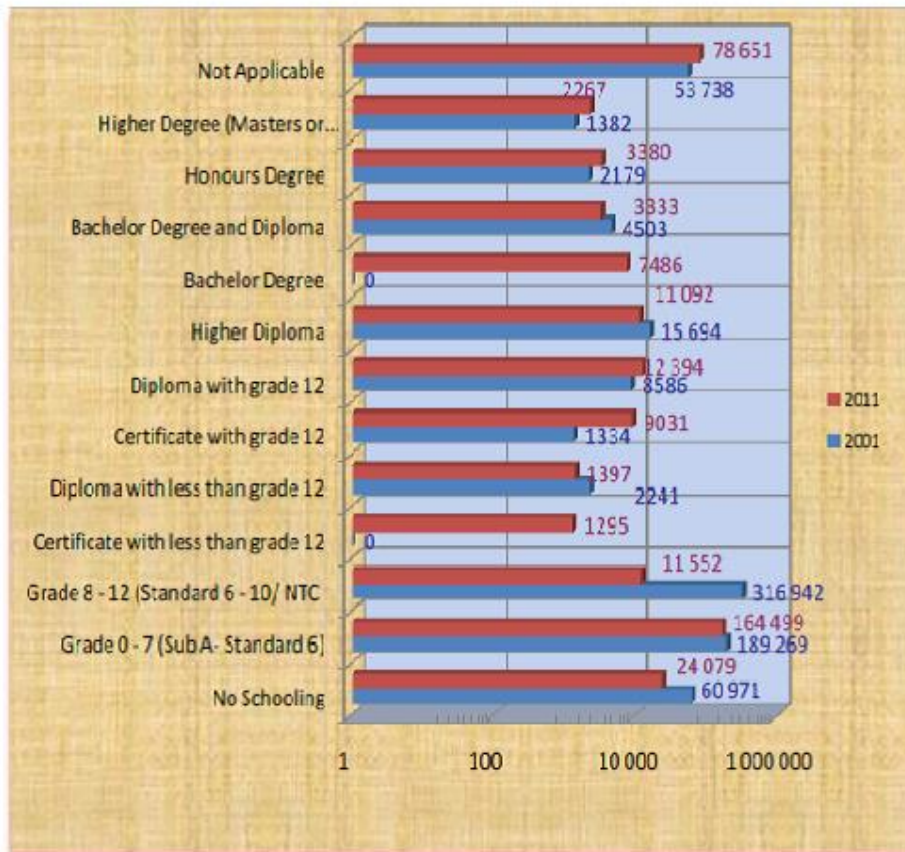


Figure 3.2: Education level of residents in ELM according to 2011 data (source: Statistics South Africa – 2012/13).

3.6. Water and sanitation provision in Emfuleni Local Municipality

According to the municipality’s annual report for 2017/18, the municipality complies with the National Water Act (Act no. 36 of 1998, hereafter NWA). The purpose of the NWA as stated in section 2 is to ensure that South Africa’s water resources are protected, used, developed, conserved, managed and controlled in ways which take into account factors such as:

- meeting the basic human needs of present and future generations;
- promoting equitable access to water;
- promoting the efficient, sustainable and beneficial use of water in the public interest; and
- providing for the growing demand for water use.

According to the Emfuleni Local Municipality's annual report (2017/18:8) the NWA further requires that the Department of Water Affairs implements a management system to ensure that all water service authorities comply with the requirements of the NWA. The ELM conducts monthly monitoring and analysis of potable water quality in compliance with the SANS241 standard, and a 100% compliance was recently achieved (IDP, 2019/20:52).

ELM's IDP for 2019/20 provides information about water and sanitation. This information is reproduced in Tables 1 to 3 below. According to the IDP (2019/20:52-53), ELM's water unit responsible for the distribution of potable water and the collection, conveyance and treatment of wastewater is known as Metsi-a-Lekoa. In addition to these functions, the unit is also responsible for the maintenance of the water services systems, as well as all costs associated with all the assets, including maintenance, insurance, licensing and running costs. The IDP (2019/20:52) further reported that there is 100% water supply coverage to all formal and informal settlements. In the informal settlements, the water is supplied in accordance to the RDP standard (a communal tap). The water system is composed as summarised below:

- 2 677 km of pressurised water pipelines
- 5 high-level reservoirs
- 10 low-level reservoirs
- 1 0.5 Mℓ/day potable water treatment plant
- 14 528 network valves
- 6 232 fire hydrants

The IDP (2019/20:52) reports that monthly monitoring and analysis of potable water quality in compliance with the SANS241 standard was done, and 100% compliance was achieved. Table 1 provides information on household sources of water in ELM.

Table 3.1: Household source of water of ELM residents (source: Statistics South Africa – 2011/16).

HOUSEHOLD SOURCE OF WATER		
	2011	2016
Regional/local water scheme (operated by municipality or other water services provider)	212 002	245 323
Borehole	3 822	4 408
Flowing water stream/river/spring/rain water		147
Spring	107	
Rain water tank	418	
River/stream	97	
Water vendor	648	268
Other	2354	2193

The sanitation gravity network provides waterborne sewerage connections to 230 000 stands in the area, and a further 5 250 stands make use of on-site sanitation systems like French drains and septic tanks.

Table 3.2: Total use of water by sector in cubic metre (source: ELM IDP 2019/20).

	Agriculture	Forestry	Industrial	Domestic	Unaccountable water losses

2012/13	638 853	0	1,360,250	62,812,996	29,696,231
2013/14	615 086	0	1,576,542	58,138,576	31,549,282
2014/15	603 213	0	1,435,099	61,006,954	30,556,625

Table 3 indicates that most water consumption is mainly for domestic use. Therefore, water quality cannot be compromised, as this will affect the people who use it.

Table 3.3: Type of household toilet facilities for 2011 and 2016 (source: Stats SA-2011/16).

TYPE OF TOILET FACILITY	2011	2016
None	2257	
Flush toilet (connected to sewerage system)	194098	229684
Flush toilet (with septic tank)	4322	6854
Chemical toilet	557	658
Pit toilet with ventilation (VIP)	1832	672
Pit toilet without ventilation	13577	10168
Bucket toilet	2029	1503

Table 4 shows that the number of flush toilets connected to sewerage systems increased from 158 311 in 2001 to 194 098 in 2011. The number of pit toilets without ventilation have decreased from 17 918 in 2001 to 13 577 in 2011.

In their IDP (2016/17:49), ELM has disputed the Statistics South Africa report on the bucket system, and stated that it does not use a bucket system as reported. However, in areas like Evaton and Small Farms there are backrooms and shacks occupied by tenants that are not connected to the sewerage network. Only the main house within the same yard is connected to the main sewerage network. The message from this table is that 18% of residents do not have flushing toilets – creating a risk for pollution, or health risks associated with sanitation.

3.7. Water pollution in Emfuleni Local Municipality

Pollution is one of the challenges that communities in the municipality face as a result of the industrial development in the area. For the purpose of this study, only water pollution is discussed. ELM, as well as the Metsimaholo District Municipality and Lesedi District Municipality, face a serious challenge with regard to pollution, mainly in the forms of water and air pollution. To a lesser extent, soil pollution is also experienced. Pollution has been acknowledged as one of the sources of various health challenges that ELM faces, due to the heavy chemical industries, mining activities and steel manufacturing industries in the area. In some instances, the chemical waste products released by industries and mines in Vanderbijlpark and Vereeniging cause water pollution in the area. In other instances, some farms release chemical waste into the water, which eventually ends up in the Vaal River. The ELM IDP (2019/20:98) stated that pollution in ELM exceeds the international health standards by more than 200%, however the previous IDP reports never reported on this serious situation facing the local residents of this municipality. The IDP further reported that the air quality is poor, water pollution is high mainly because of ecoli, as well as heavy metals from industrial pollution emanating from both outside and inside the ELM. The ELM IDP (2019/20:98) reports that the area has been declared a Vaal Traingle Air Shed Priority because of poor quality of air that citizens in this area breathe.

Pollution in this area can be seen as the causes of illness, and Mohapi (2009:143) also noted that studies indicate that respiratory ailments and diseases, such as a morning cough, skin irritations, wheezing and asthma are common irritations that people in the area suffer. In some instances, their health deteriorates so much that medical practitioners have advised some families to leave the area in order to improve their health and especially the health of their children.

In its 2010 report, the Council for Scientific and Industrial Research (CSIR) states that poor water quality not only limits its utilisation value, it also places an added economic burden on society through both the primary treatment costs and the secondary impacts on the economy. The Claassen report (2010:5) noted that pollution has a direct burden on economic factors such as high treatment costs of water, bad health due to poor quality of water, and other waterborne diseases and substandard agricultural products due to contamination of crops.

Claassen (2010:5) further indicates in the CSIR report that various sectors of the economy have to use water efficiently in order to ensure long-term sustainability of the available water resources. Pollution has to be minimised to reduce water purification costs to ensure that clean water is affordable especially to the poor, and to re-prioritise water usage in various sectors of our economy. Nationally, the report also looks into the lower costs in the desalination of sea water for human use, which can provide an avenue of increasing water supply for human utilisation.

Finally, Claassen (2010:5) concludes that the biggest threat to a sustainable water supply in South Africa is not a lack of storage, but the contamination of available water resources through uncontrolled water pollution, which eventually contaminate the groundwater. This has caused a number of disease outbreaks in South Africa, citing the Delmas sewer pollution incident in 2005 and 2006.

The ELM sewerage works has been deteriorating for many years. This has drawn the attention of Parliament due to the various complaints of communities and court cases against the municipality. This culminated in the visit of the Parliamentary Monitoring Group to investigate the progress on issues like the spillage of raw sewage into the Rietspruit in Evaton, as well as acid mine drainage from the central basin, which results in the pollution of the Vaal River. The conclusion of this visit was that water pollution in South Africa is of the utmost concern, because water is a scarce resource. The Parliamentary Monitoring Group (2015) identified the following causes for the increase in pollution:

- the disturbance of natural vegetative land by the building of houses, roads and industries (such as mining and petroleum industries);
- increased population density in areas with insufficient infrastructure to deal with increased amounts of waste and sewage; and

- inadequate sewage collection and treatment in many parts of the country.

According to Gouws et al. (2007:12) there has been an increasing number of incidents of toxic wastewater spills in the Vaal River Barrage since 2005. This resulted in concerned residents of the Vaal Triangle and NGOs working side by side to address the crisis that posed a health threat. Gouws et al. (2007:13) further report on the influence of pollution on river ecosystems:

‘In early 2006, thousands of fish were killed in the Vaal River as a result of extraordinary rains. The increased water volumes flooded wastewater treatment works and untreated sewage landed in the Vaal River from the Klip River. The spill, the first of three in 2006, affected endangered indigenous yellow fish in the Vaal River, as far downstream as the Bloemhof Dam. Among the first to respond to the fish kills were Eco-care, a non-governmental organisation, the Yellow fish Working Group (YWG), an active multi-stakeholder research group, and the angling retail sector with an estimated national annual turnover of more than R13 billion’.

This extract highlights the impact that untreated sewage has had on the aquatic life of the Vaal River. Sewage pollution comes from ineffective municipalities in Johannesburg, which pollute the Klip River a tributary of the Vaal River, and from ELM. Excerpts from the Rand Water reports below indicate the water quality at various sampling sites. The reports clearly show the sites where most pollution occurs. Despite the fact that municipalities are charged by the South African Constitution (Constitution of the Republic of South Africa, Act no. 108 of 1996) to be custodians and champions of water, and to prevent water pollution in their areas of operation, they are the main polluters, because they fail to process sewage properly. The partially treated sewage is then released into the rivers.

According to IDP 2019/20 ELM has the combination of industrial, domestic, transport, biomass burning, agriculture and other emission sources that have led to degraded air quality over ELM area. This in turn impacts on the health and well-being of people residing in the area. The IDP further reported that ELM also is responsible for monitoring of water quality that comprises of the monitoring and surveillance of water quality and checking the availability of water intended for human consumption and recreational, commercial and industrial use.

The Rand Water reports further indicate that faecal matter is the main pollutant of the streams running into the Barrage catchment area and the Klip River (which runs through ELM). The cause for the faecal pollution is ineffective sewage treatment plants. The cause of this pollution can be resolved if all role players are made aware of the situation, and take an active role in the various water forums that have been formed. The Rand Water monthly year on year reports

that provide the results of the contents of water from various points. These reports provide data for the Klip River, Rietspruit, and Suikerbosch found in ELM, flows into the Vaal River in the area under ELM jurisdiction as part of the Barrage catchment area.

According to Tempelhoff et al. (2007:120) forums have established guidelines for water quality, clustered into four groups. The first group (phosphates, ammonia, nitrates, and faecal coliforms) indicates pollution from sewage. The second (sulphates, chlorides and heavy metals) indicates pollution from mines (the acidity is also an indicator of acid mine drainage). The third (fluorides, chemical oxygen demand and other indicators) shows industrial pollution. The fourth group (the overall toxicity of the water) is tested on water fleas and guppies (fish). The challenges to monitoring are complex, and there are many loopholes. Polluters can, for example, flush pollutants into the river between testing times (these times are regular and known) and escape detection. The Randwater reports provide important data that assists to identify various polluters and provide critical information for residents and users of water from these streams. The reports assisted in identifying the extent of pollution that was coming from the Sebokeng water treatment which was flowing into the Rietspruit and caused serious damage on the aquatic life in the LochVaal area, which led to involvement of the National government in Emfuleni.



Figure 3.3: an image of wastewater flowing down the Klip River into the Vaal River Barrage (Tempelhoff et al., 2007:14).

In highlighting the visible impact of pollution, Tempelhoff et al. (2007:14) provide the picture in figure 3.3, showing how the polluted Klip River impacts the Vaal River.

Water pollution in the ELM townships remains a subject for further research. It seems as if the extent of pollution in the townships has not been established, nor understood. The health cost, including mortality as a result of water pollution, has not been established, and can thus be a subject of further research, in order to fully understand its impact. The website of the Vaal Environmental Justice Alliance (VEJA) provides information regarding the reality of water pollution, and reveals that ELM has faced varying degrees of water pollution over many years, and that this situation is deteriorating (VEJA, 2016).¹ The photograph in figure 4 appears on

¹ On a personal note, the researcher has lived in the Emfuleni Local Municipality for more than 40 years and cannot remember life without polluted water and raw sewage running through the streets of some townships in ELM, especially in Evaton.

VEJA's website and illustrates the extent of the water pollution, as well as the resulting risks that residents from townships in ELM face on a daily basis. The picture was taken in an unnamed township, and reflects a common sight in various townships throughout the country where young children are growing up in polluted areas, which may lead to them contracting various waterborne diseases.



Figure 3.4: a young child next to an unspecified polluted waterway in the Vaal Triangle (vaalenvironmentalnews.blogspot.co.za).

The picture does correspond with the ELM IDP 2019/20 report, which has indicated the pollution of unprecedented level and serious challenges with regard to water pollution and treatment of sewage. This situation highlights the need for an active civil society that will force the local municipalities to take responsibility to ensure that such exposure to water pollution is eradicated.

As indicated in the NWA, the responsibility for managing water issues has been delegated to the various catchment forums and river forums. ELM is home to four such forums: the Rietspruit Forum, the Barrage Forum, the Klip River Forum and the Blesbokspruit Catchment

Forum (for the Suikerbosrand River). These rivers all have their source outside of the municipality’s jurisdiction, but they flow into the Vaal River in ELM.

3.8. ELM water treatment plants

Table 3. 4: sewage treatment plants in ELM (source: ELM IDP draft, 2007/8:40).

Sewage treatment works	Catchments	Details
Rietspruit	Vanderbijlpark and Boipatong.	23 Mℓ/day capacity; discharges into the Rietspruit and the Vaal River (below the Barrage).
Leeuwkuil	Vereeniging, Sharpeville and Tshepiso.	32 Mℓ/day capacity; discharges into the Vaal River.
Sebokeng	Sebokeng, Evaton, Palm Springs, Orange Farm and areas of Johannesburg.	119 Mℓ/day Capacity; discharges into the Rietspruit.

Table 5 shows the capacities of the various sewer treatment plants and the amounts of water from treated sewer that is discharged to various rivers on daily basis.

3.9. ELM environmental policies: the environmental impact management policy of 2009 and water and sanitation bylaws of 2004

This section considers the municipality’s environmental policies relating to water and sanitation, and describes the roles of ELM officials who occupy positions in the departments that are meant to provide services to the communities.

The objective of the ELM environmental impact policy of 2009 is to promote and increase environmental awareness in the municipality (ELM, 2009).

3.9.1. Environmental impact management policy

Environmental impact management necessitates that the municipality takes the following aspects into account when conducting its activities:

- all municipalities are required to plan and manage all their activities in an environmentally conscious manner that embraces sustainable development;
- the planning and development of infrastructure, housing and service delivery should take environmental opportunities and constraints into account;
- the sustainable management of biodiversity, open spaces, conservation areas and natural resources must be ensured;
- environmental matters must be considered when planning economic and social activities;
- sustainable energy approaches, the improvement of air quality, sustainable water management and the conservation of cultural resources must be considered; and
- environmental forums should be formed to improve environmental reporting in the municipality.

3.9.2. Environmental compliance monitoring and enforcement

Monitoring entails that the municipality takes the following steps to ensure that all parties comply with environmental regulations:

- attending to environmental management complaints in the municipality;
- conducting site inspections and investigations on industries;
- creating industrial forums to raise awareness of environmental legislation;
- cultivating and developing cooperation between industries and the municipality;
- improving air quality by regulating fuel-burning appliances in the municipality; and
- drafting and implementing environmental management bylaws.

3.9.3. Industrial environmental impact management

The municipality should mitigate the impact of industrial activity on the environment, for which the following actions are necessary:

- regular meetings with industries to increase cooperation;
- the identification and creation of a database for all industries with activities that have an impact on the environment;
- regulating industries by regular site inspections and visits;
- promoting sustainable energy approaches to industries; and
- promoting sustainable transport planning and modes of transport to industries.

The points of the policy, as discussed above, reflect the role that ELM has taken upon itself (excluding other statutory obligations). The ELM environmental policy of 2004 further states that environmental management is a constitutional prescription, and that all three spheres of government are enjoined to cooperate in pursuit of the functions stated in section 24 of the Constitution of the Republic of South Africa. It is in this context that the Constitution places a positive duty on the municipal sphere of government to take reasonable legislative and other measures to ensure that issues listed are attended to.

3.10. Water and sanitation bylaws of 2004

As indicated in the ELM environmental management policy, the municipality has a legal mandate to be the custodian and champion of environmental management issues in its area of jurisdiction. The present section considers the role that ELM should play in mitigating water pollution in the area. The following are key responsibilities of the municipality, as indicated in sections 71–74 of Provincial Gazette No. 183 of May 2004:

- monitoring the pollution of all water that enters rivers and catchment areas;
- approving the discharge of effluent from industries that is above the specified limits into rivers and streams;
- the withdrawal of approval to discharge effluent into rivers and streams;

- determining quality standards for effluent to be discharged into the sewerage system, rivers and streams; and
- determining conditions for the discharge of effluent.

The above places a responsibility on ELM to monitor pollution, provide approval for effluent to be discharged into streams and confirms the custodian and oversight role that ELM has to play in water treatment and water quality for their area of responsibility.

3.11. Environmental NGOs operating in ELM

NGOs play an important role in the community. NGOs exist primarily to complement government in specific areas of operation. They mainly rely on private and donor funding. NGOs worldwide are forerunners to governments, and have proven to be valuable in the work they are doing. Against this background, two key environmental NGOs are discussed, in order to describe the environment in which ELM operates.

3.11.1. Vaal Environmental Justice Alliance (VEJA)

According to their website, VEJA was established in 2004, and was formally launched in Sebokeng on 10 October 2006. It has 13 affiliate organisations from surrounding areas such as Sebokeng, Bophelong, Sasolburg, Evaton, Boipatong and Sharpeville. Their office is based in Vanderbijlpark. VEJA has the following objectives:

- to promote a culture of environmental awareness and sustainable development;
- to provide a local network of support and assistance to community-based organisations, NGOs, trade unions, religious groups, women's groups and youth groups;
- to perform an educational role in the promotion and explanation of the interrelated nature of social, political, environmental and economic factors that limit or enable the achievement of a sustainable, equitable and just society, as well as to promote the wise use and conservation of natural resources; and
- to engage with other role players, including (but not limited to) the local authority, provincial government and industry and commerce, in order to promote a healthy, safe and sustainable environment.

VEJA has also established task teams to focus on issues related to air quality, climate change and energy, water quality, waste, and environmental health.

These objectives illustrate this organisation's aspiration to educate and involve communities in environmental health. The extent to which these objectives are achieved is something that needs to be researched. It is a positive indication that the objective of this NGO (together with the community) is to fight environmental injustice that may be perpetrated by industries, governmental institutions, and the communities.

3.11.2. Save the Vaal Environment (SAVE)

SAVE is a non-profit organisation that aims to protect and maintain the environmental integrity of the Vaal River and its environs in the area between the Vaal Dam and Parys (SAVE, 2013). The organisation has earned an excellent track record for winning legal battles against polluters, as well as a renowned reputation for vigilance against polluters and environmental threats to the Vaal River. SAVE further raises awareness about environmental threats, and the organisation maintains a war chest of funds obtained through fundraising efforts to fight legal battles against all polluters of the Vaal River (SAVE, 2013).

According to SAVE's website, South Africa faces extraordinary challenges in relation to the sustainable management of freshwater resources. Some of the pressures on the country's water governance system include historical and ongoing water pollution by the mining industry, the failure of municipal water treatment, the discharge of untreated sewage into waterways, and the over-abstraction of water for agricultural purposes. All of these challenges are becoming increasingly acute as the country starts to acknowledge and prepare for the risks posed by climate change.

For a number of years, the organisation has successfully litigated against ELM for the contamination of the Vaal River with raw sewage from the Sebokeng sewage treatment plant. SAVE (2013) states that the failure of sewage treatment plants can be attributed to inadequate funding, poor maintenance and management, and a lack of priority given to the problem by the responsible municipalities. It further views faecal contamination and purification of water resources as a particular and acute problem in the Vaal River catchment. SAVE (2013) observes with great concern what seems to be a shift of responsibility from national government down to local government, or at least a distancing of national government from the failings of municipalities in certain key areas, namely:

- the development and financing of water resources infrastructure;
- placing responsibility for water conservation measures and demand management interventions solely in the hands of municipalities;
- the collection of water user charges; and
- the efficient and effective operation of sewage treatment plants.

The inability of municipalities to deal with wastewater efficiently and in compliance with the law is not considered when housing developments are approved on the banks of the Vaal River. In pursuit of rates income, unacceptable environmental compromises are made. This approach should not be permitted by the Department of Water and Environmental Affairs.

SAVE already observed in 2013 that the pollution in the Vaal River is reaching alarming levels, particularly pollution from sewerage works, informal settlements and industries. As seen above (table 3 and 4), pollution is leading to staggering E. coli counts at some sample sites in the Vaal River. SAVE has called for information relating to sewage treatment plants, their location, reports on their function, water quality reports and details of any action taken by the Department to compel compliance with the law in an effort to force all organs of state to take matters of water pollution seriously.

SAVE took ELM to court successfully for allowing raw, untreated, and improperly treated sewage to flow into the Vaal River at Vanderbijlpark. Since January 2006, South African newspapers have been covering the ongoing sewage pollution of this section of the Vaal River, including the matters cited by Tempelhoff et al. (2007:11-14) on the sewage pollution wherein SAVE took ELM to court (in all of which SAVE was successful):

- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2008/40064, 21 November 2008.
- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2008/41402, 5 December 2008.
- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2008/41558, 5 December 2008.

- *SAVE v Emfuleni Local Municipality and Others* (unreported), Johannesburg High Court, case no. 2009/1490, 9 April 2009.
- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2009/20978, 26 May 2009.
- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2009/20978, 3 June 2009.
- *SAVE v Emfuleni Local Municipality* (unreported), Johannesburg High Court, case no. 2009/20978, 12 February 2010.

After conducting an analysis of the legislation that governs water issues, the Centre for Environmental Rights (CER) concluded that it appears that the key statutes – the Water Services Act (Act no. 108 of 1997) and the NWA – either do not adequately empower authorities to manage water resources, or the implementation of these statutes is failing. Some of the areas of concern identified by the CER include (Centre for Environmental Right; 2012):

- the lack or inadequate or slow implementation of existing statutory tools and institutions, such as the water resource classification system, reserve determination, water users' associations and catchment management agencies and strategies in the NWA;
- slow and inappropriate licensing and other key decisions that ignore the requirements of the NWA and other strategic documents like the National Water Resources Strategy (2004);
- the use of procedural loopholes and shortcomings in the NWA to avoid public consultation for water use licence applications, amendments to licences and to refuse access to the Water Tribunal for appeals;
- the lack of a coherent compliance monitoring programme and a strategic enforcement programme, and severely under-resourced compliance and enforcement sections within the Department of Water Affairs; and
- the general downgrading of the political and strategic importance of water resource management and the Ministry and Department of Water Affairs.

3.12. The industrial development of ELM

In recapturing the history of Vereeniging, Meyer and Strauss (2014) state that Stow's discovery of coalfields along the banks of the Vaal River in 1878 was the beginning of the industrialisation of the area. Vereeniging was the first town of what would later become known as the Vaal Triangle to be established in the 1880s after this discovery. Coal was initially meant to be exported to Kimberly using the Vaal River, however, the river became the main attraction for industrialists because of the simultaneous availability of coal and water, which is key to industrialisation. The coal mines and water from the Vaal River were vital ingredients that enhanced the importance and growth of Vereeniging, especially after gold was discovered in Johannesburg in 1886. Thousands of prospectors flocked to this newly established gold mining town, and Vereeniging became Johannesburg's main source of coal. It was later used to supply the water required by the Victoria Falls Power Station, which was erected in 1911. The establishment of the Union Steel Company in 1927, the founding of Iscor in 1928, the arrival of Stewarts and Lloyds in 1930 and the founding of Sasol in 1950 contributed to establishing the Vaal Triangle as the hub of industry for South Africa up to the present day. ELM is at the heart of the history of industrial development in the Vaal Triangle, because both Vereeniging and Vanderbijlpark are under the jurisdiction of this municipality. Both towns are on the banks of the Vaal River (which borders Sasolburg in the Free State). This history is critical in order to understand why water issues are important for ELM.

According to Tempelhoff et al. (2007:108), the Vaal River played a crucial role in the development of the country. In size, the river extends over a distance of just more than 1 300 km. By international standards, the river is considered a medium-sized waterway. However, in Southern Africa, a water-stressed region, the Vaal River is of vital importance, and has been labelled, with good reason, as one of the hardest-working rivers in the country. The Vaal River is a tributary of the Orange River and, unlike most rivers in the country, both rivers flow from the water-rich Drakensberg in the eastern interior, to the Atlantic Ocean, on the border between South Africa and Namibia in the West.

According to (Parliamentary Monitoring Group, 2015), the White Paper on a National Water Policy for South Africa (1997) and the NWA are explicit about the need to protect aquatic ecosystems in order to allow for sustainable achievement of social and economic benefits from these systems. A balance between protecting rivers and achieving economic development is required. Other important guidelines that stem from policies, protocols, regulations, and other

legislation, refer to the need to develop a strong policy for waste discharge charges, water quality management, groundwater protection, and support for local capacity building, as well as ensuring a healthy ecosystem for all citizens in South Africa.

3.13. Church communities in ELM

In South Africa, churches and religious organisations are key components in most communities; this is also the case for ELM. The following section discusses the major denominations in ELM in order to provide a Christian context for this study.

3.13.1. Nederduits Gereformeerde Kerk (NGK)

The NGK was among the first Afrikaans churches in the Vaal Triangle (Prinsloo, 1994:454). The first NGK was established on 16 March 1912 in Vereeniging. Among the first NGK churches were the De Deur, Houtkop, Vlakfontein and Evaton congregations. The initial membership was mainly farmers in and around Vanderbijlpark. The Vanderbijlpark congregation was given independence from Vereeniging in 1949 (Prinsloo, 1994:454).

3.13.2. Nederduitsch Hervormde Kerk (NHK)

The Nederduitsch Hervormde Kerk was established in Vereeniging in 1913, and the Vanderbijlpark congregation was given independence in 1950. According to Prinsloo (1994:455), the growth of the NHK continued with the establishment of congregations in Meyerton in 1950, Duncanville in 1954, Vanderbijlpark East in 1958, Three Rivers in 1961, Rietspruit in 1965, Vanderbijlpark South in 1975, Three Rivers East in 1983, Meyerton South in 1983 and Sonlandpark in 1983.

3.13.3. Gereformeerde Kerk (GKSA)

The Gereformeerde Kerk was established in Vereeniging in 1927, and the unveiling of its building took place in 1931. The Vanderbijlpark congregation of this church became independent on 21 April 1952. From this congregation, two more congregations were established, namely Vanderbijlpark South (1962) and Vanderbijlpark East (1972) (Prinsloo 1994:455).

3.13.4. The Methodist Church

The Methodist Church was established in Vereeniging in 1898. As was the case with the aforementioned churches, the Vanderbijlpark members belonged to the Vereeniging congregation until their independence in October 1950 (Prinsloo, 1994:455).

3.13.5. The Anglican Church

The establishment of the Anglican Church in the Vaal Triangle was similar to that of other churches; the members of the Anglican Church who lived in Vanderbijlpark were part of the Vereeniging congregation. The Vanderbijlpark Anglican Church was given independence in 1949 (Van Zyl, 1993:208).

3.14. The development of churches in townships

The first churches in the township areas of the Vaal Triangle were established as from 1915. These churches included the NGK, the Methodist Church of South Africa (Wesleyan), the Apostolic Faith Mission Church, the African Methodist Episcopal Church, the Zion Church, and the Baptist Church (Van Zyl, 1993:208).

Significantly, the Roman Catholic Church and the Anglican Church initially allowed their members to attend services with their white counterparts. The churches were segregated in 1932 with the establishment of Top Location in 1932. The provision of sites for building black churches was given on the condition that black churchgoers would no longer be allowed to attend services in the white areas (Van Zyl, 1993:208).

Between 1953 and 1956, the NGK built a church in Sharpeville (Folscher, 1991:16). The African Methodist Episcopal Church (AME) in Sharpeville was built with funds raised in the township and the USA (Leigh, 1968:98).

Among the first independent African churches was St John's Apostolic Church in Evaton, founded by Mrs Nku. This was after a call that she must pray for the healing of the sick. This has made the church popular to this day, because people came from all over South Africa to be healed. Arch Bishop Nku realised the need for education, and started a school under the auspices of the church in Evaton. The church has grown significantly and still enjoys popularity (Mohapi 2009 :161).

The McCamel Church is one of the oldest independent African churches, and operated in Evaton in a similar manner to that of St John's Apostolic Church. Its focus was on spiritual healing for the sick. Under the leadership of Reverend Lord McCamel, the church further focused on political matters and provided political activists with asylum in the church building (Mohapi 2009:161).

3.15. Major political events in ELM

This section provides a brief overview of the Sharpeville Massacre (1960), the Vaal rent boycotts (1984–1986), and the Boipatong Massacre (1992), all of which occurred in ELM. The intention of this section is not to give an exhaustive account of these events, but rather to sketch the kind of context in which the churches in this area function.

3.15.1. Sharpeville Massacre (1960)

ELM has been the host area for several significant events in South African history before the advent of democracy. The massacre of pass law protesters in Sharpeville in 1960 shocked the world, but helped intensify the struggle for liberation of the oppressed black majority. Noonan (2003:76) provides details on this event. Robert Mangaliso Sobukwe, the Pan African Congress chairperson, started the campaign on 21 March 1960 by inviting arrest at a police station in Johannesburg, along with 50 supporters. Similar demonstrations took place in Cape Town, Durban and Pretoria, although their attendance was lower. However, about 10 000 black people gathered in Evaton (near Vereeniging). They only dispersed after several military aircraft flew low overhead. In Sharpeville, as early as five o'clock on the morning of 21 March, a crowd of between 5 000 and 7 000 people slowly began to gather outside the Sharpeville police station and demanded arrest. The protesters gathered to wait for buses which did not arrive. The tragic events were catalysed when the police tried to arrest one of the protest leaders: a struggle ensued and the crowd surged forward at the fence. Despite the fact that no order was given to fire, police fired at the hostile crowd for approximately 40 seconds out of panic. People ran in all directions to save themselves from the bullets. Eventually, 69 people were killed. The majority of those who were shot, were shot from behind as they ran for cover.

Another crowd, 4 000 strong, marched to the police station in the nearby industrial town of Vanderbijlpark. The militancy of the people in this area stands out, and hence the apartheid regime had to take serious action against these huge crowds. Prayer meetings were also held in many churches in Sharpeville and preparations were made for the burial of the deceased.

3.15.2. Vaal rent boycotts (1984 – 1986)

The anti-rent uprising started in ELM on 3 September 1984 with large-scale disturbances erupting in the black townships, and then swept through the rest of the country. This unrest lasted longer, cost more lives and caused more material damage than any previous black uprising in South Africa (Liebenberg, 1993:498).

During the month of July 1984, the then Lekoa Town Council decided to raise tariffs for municipal services in the townships of Sebokeng, Sharpeville, Boipatong, and Zamdela by about R 5.00 a month. The communities were dissatisfied by the increases and this created the platform for the political unrest which was simmering. The political liberation movements under the United Democratic Front, and other civil organisations, decided to conduct a protest march to the offices of the Lekoa Town Council. This led to a confrontation with police and large-scale rioting erupted. Shops were looted, buildings were set alight and members of the Lekoa Town Council were murdered (Liebenberg, 1993:499).

The refusal by the Lekoa Town Council to cancel the increases prompted the Vaal Civic Association to organise a stay-away, a school boycott, and a march for 3 September 1984. On this day, the black workers in the Vaal Triangle observed the biggest stay-away the region ever saw in those days. The stay-away was undisputed and no public transport operated; the buses that operated were burnt. Protest marches took place in all the townships of the Vaal Triangle, but it was in Sharpeville that things took a horrific turn with the killing of Councillor Khuzwayo Jacob Dlamini (Noonan, 2003:47).

Initially, eight people were arrested in connection with the murder. Later, two of the accused, Christian Mokubung and Gideon Mokone, were sentenced to eight years in prison. The remaining six people who received the death penalty were known as the “Sharpeville Six” (Noonan, 2003:54).

The trial and sentencing of the Sharpeville Six drew national and international headlines. All of the accused maintained that they were not anywhere near the scene of the murder when it happened. Many countries threatened South Africa with further sanctions should the six be hanged. As a result, various human rights groups around the world, particularly in Europe and the USA, marched in protest to their governments in support of the Sharpeville Six. This placed further pressure on the South African Government.

3.15.3. Boipatong Massacre (1992)

The Boipatong Massacre that threatened the CODESA negotiations on the eve of democracy also took place in the Vaal Triangle. The massacre occurred during a night vigil in January of 1992, and 38 people were killed by alleged Inkatha Freedom Party supporters who were discouraging African National Congress support in the area. Violent incidents in the Vaal Triangle continued for some time, and were characterised by the indiscriminate shooting of residents in the Vaal Triangle townships. Numerous attacks by gun-wielding men have taken place at shebeens and railway stations, in which patrons and commuters were killed indiscriminately.

Events of this nature created a platform where the churches and civil society cooperated to speak against injustice, and also to provide support to the victims of such atrocities. The churches comforted the grieving families, and the church buildings were used to provide accommodation for political and civil organisations. According to Noonan (2003:9), national and international journalists were invited to report on the shootings, torture and acts of revenge committed by vigilantes in collaboration with the police. Churches made several efforts to bring peace to the area after numerous complaints were raised about the fact that the KwaMasiza hostel apparently accommodated the murderers. Reverend Moerane approached Iscor on 15 June 1992, but the company denied that these people resided on their premises.

On the fateful night of 17 June 1992, defenceless families were trapped in their homes as crazed night marauders burst into their living rooms with bloodstained hatchets, pangas, knopkieries and homemade spears held aloft to destroy whatever stood in their way. Boipatong woke up the next morning to 21 people, including babies, brutally killed, and many severely injured. The country's mood changed and the CODESA negotiations were postponed. Nelson Mandela was forced to address the angry community of Boipatong.

3.16. Conclusion

ELM is situated in the heart of the water supply and water catchment area of the entire Gauteng Province. This places ELM in a strategic position for both the Gauteng and the Northern Free State, where the Vaal River borders these two provinces. ELM is not solely responsible for the pollution of waterways; pollution comes from outside the area as well (e.g. the sources of the rivers and streams). The Rand Water water quality report indicates the various sources and points of pollution, as well as the major pollutants, namely acid mine drainage and poorly

treated or raw sewage dumped into the rivers and streams. Sewage from various treatment plants inside and outside ELM is a particular problem and contributor to the water pollution in all the rivers and streams, with the exception of the Suikerbos River. The Klip River and the Rietspruit are heavily polluted due to Johannesburg Metropolitan Council's pollution of the Klip River with faecal waste, and ELM's pollution of the Rietspruit. The NGOs that are active in ELM have been instrumental in raising awareness, and have successfully challenged polluters in court. The suggestion of various actions that can be taken by various stakeholders (especially by civil society, as had been the case) seems to have been effective in enforcing compliance from polluters in ELM. The recommended action plans may also contribute to further improvement of water care, and a reduction of pollution. This is an urgent need for both the ecosystem and the community. While NGOs have been effective, statutory bodies, such as catchment management agencies, have not. This seems to be as a result of an absence of action from civil society specifically aimed to address the actions of major polluters, namely the heavy industries in the Vaal Triangle, and the municipalities. ELM, who can boast a historically rich heritage in the South African context, must improve its focus on matters of water pollution to avoid embarrassment, especially when its legal and constitutional mandates are taken into account.

CHAPTER 4: EMPIRICAL RESEARCH DESIGN AND METHODOLOGY

4.1. Introduction

This chapter presents the quantitative research design, which utilises one survey instrument. The population sample was taken from the Roman Catholic Church congregations in ELM. The Roman Catholic Church was chosen because of its established Catholic Social Teaching (CST) on water care. The purpose for the CST is to “point towards a range of claims regarding the value and significance of fresh water” (Peppard 2013:65). It is the researcher’s opinion that CST gives the Catholic Churches an advantage over other churches that may not present structured teaching in water care for its members. In its long history, the Catholic Church have had among its friars people such as Saint Francis of Assisi and others, who cautioned about the caring protection of nature, and the destruction of the environment by human beings in their quest for civilisation. It is assumed that this leadership had contributed immensely to the teaching of caring for the environment and earth keeping, and that this has created the ethos of caring for the earth and creation. The literature review presented in Chapter 2, and the historical background of the ELM in Chapter 3, form the bases for the structured questionnaires which were used to probe the level of knowledge and participation of the priests and congregants regarding environmental issues, with a particular focus on water.

4.1.1. Significance of the study

Having the view of both priests and congregants is crucial to understand the views of the church on environmental issues, with the specific focus on water from both the Priest's perspective as those entrusted and trained to teach the church and those receiving the teaching. The knowledge will help to identify the impact of the teaching that is taught in the church on environmental issues focusing on water and provide the awareness prevailing in the church. Secondly, the surveys will also provide insight on some of the interventions that may be required to help the church to be conscious and active in the communities as part of executing its cultural mandate as given to human beings by God in Genesis 1:27-28. Lastly, this will provide insight to the effectiveness of the teaching by the Priests on water-related environmental issues. This study will survey a sample from the Priests and congregants in the Roman Catholic churches in the ELM, and aims to investigate their knowledge and views regarding their involvement in environmental issues with the focus on water-related matters.

The aim of this study is to assess the extent of consciousness and involvement of the Priests and congregants in water-related environmental issues in ELM.

4.2. Research design and methodology

Delpont (2005:159) defines research design as the plan, recipe or blueprint for the investigation, and as such, provides a guideline according to which a selection of data-collection methods which are appropriate to the researcher's goal and to the selected design. This research design will set out the outline and structure that will be followed to conduct the research. This design will serve as a framework in order to ensure that the research follows the direction as envisaged by the research question (Leedy & Ormond, 2005:85).

There are two broad approaches commonly used by researchers to collect data, which are the qualitative and quantitative approaches or methods (Denzin & Lincoln, 2005:140). It is, therefore, important for the researcher to select the most appropriate and convenient method, by considering various factors while planning the research, such as costs and time, in order to reach the specific research aims and objectives (Denzin & Lincoln, 2005:32).

The quantitative method appears to be relevant for the research that is proposed for this study, and this method will be discussed in detail to give better insight on what factors are important to consider when using this method. According to De Vos, Strydom, Fouché & Delpont (2005:74), a quantitative study can be defined as, "an inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalisations of the theory hold true". This research method uses descriptive statistics as a method of organising data, facilitating the organisation and the interpretation of numbers obtained from measuring a characteristic or variable. To this notion of quantitative research can be added Delpont's (2005:159) definition of research design. Delpont (2005:159) which states that research design is the plan, recipe or blueprint for the investigation, and as such, provides a guideline according to which a selection of data-collection methods which are appropriate to the researcher's goal and to the selected design, can be made therefore, it is quantitative research methods that will provide the plan and framework for this study.

The research will explore the current status with regard to participation in water-related environmental issues by selected participants. This research will be exploratory in that it will establish whether participant's level of awareness, participation and understanding of biblical knowledge on water-related environmental issues as defined by Dane (2010:7). This method will be used as part of the methodological framework because it will assist in establishing what the status is regarding the church's involvement in the environmental issues with the focus on water-related matters.

4.2.1. The questionnaire as research instrument

A questionnaire is used in a survey where respondents in a study respond to a set of questions or statements. In this research, a survey by means of questionnaires will be used because of the following reasons, as set out by Creswell (1994:1):

- A questionnaire is a convenient way to reach a geographically dispersed sample of a population.
- Its distribution facilitates quick data collection, often as little as six weeks from the distribution to the conclusion of the data collection.
- A distributed questionnaire is very cost-effective because it involves only duplication and distribution expenses.

In addition to the reasons given above, the choice of a questionnaire as a data-collection instrument has the advantage of anonymity (Delpont, 2002:172). Best and Kahn (2003:307) raise the following disadvantages of a questionnaire as a data-collection instrument, which are noted by the researcher:

- Respondents who do not have an opinion of or the knowledge concerning the subject, will answer the questions instinctively.
- Respondents might have little interest in a particular problem and answer the questionnaire indiscriminately.
- As motivation of the respondents is difficult to check, the researcher might receive misleading responses and misinterpretations can occur.

- The respondents can be forced to give simple answers to complicated issues.
- Questionnaires that do not probe deep enough may not reveal a true picture of opinions and feelings of respondents.
- The length of a questionnaire can give cause to inaccurate responses and a low percentage of feedback.

Closed questions will be asked in the questionnaires which will provide the participant with a set of responses from which to choose one. This will make it easier for the participants to respond because they will understand the focus of the questions better. The questionnaires will further help when comparing the responses between participants during statistical analysis which will be compiled by the statistical analyst (Delpont and Roestenburg, 2011:198). For this research, the advantages of the use of questionnaires far outweigh the disadvantages, and necessary procedures will be followed to ensure validity and reliability, in order to eliminate potential barriers as set out by Best and Kahn (2003:307). Two questionnaires were developed, with each targeting a stratum of the population i.e. the priests and the congregants.

In line with Mouton (2001:86), the next paragraph will look into the literature review which is the basis of the research. This will be considered as the first phase of an empirical study.

4.3. Literature review

The literature review was covered in detail in chapter 2 with the scientific theoretical basis, where the scientific reasons why water is at the centre of climate change, biblical framework which looked into what the Bible teaches about water, theological concepts which focused on the theology on water and lastly ethical principles which dealt with ethics on water.

According to Dane (2010:64) the literature review provides relevant information about the focus and the objectives of the research. Dane (2010:64) also highlighted the importance of understanding the empirical research and theoretical context, and thus the significance of providing the literature review before continuing with the research process. Dane (2010:65) further postulates that an effective literature review should accomplish the following three purposes:

- First, it provides the reader with information about the existing research.

- Second, it should provide some indication of the reasons why existing research is not sufficient.
- Finally, it leads the reader further into the hourglass to the point at which specific information about the study is presented.

4.4. Empirical research

Leedy and Ormrod (2005:2) define empirical research as a systematic process of collecting, analysing, and interpreting information or data in order to increase our understanding of the phenomena about which we are interested or concerned. This study intentionally sets out to probe the church community's awareness and participation on environmental issues with specific focus on water.

4.4.1. Aim of empirical research

The objective and aim of this study is to assess the extent of consciousness and involvement of the priests and congregants in water-related environmental issues in ELM.

The empirical research was used to collect information from samples of respondents about their attitudes, values, habits, ideas, demographics, feelings, opinions, perceptions, plans and beliefs. In this study a questionnaire was used because it was identified as the most appropriate tool to describe and interpret what these attitudes are, as noted by Cohen, L., Manion, L. & Morrison, K. (2001:169).

This research tool will further be used to study and gather information about the biblical knowledge on the care for nature, awareness of current environmental issues and participation by the church in influencing the community to protect the earth and the environment. If the church succeed in influencing communities to protect the earth and the environment, then it will have contributed in fulfilling its biblical cultural mandate to the ELM communities.

4.5. Ethical issues

Since this study involves data collection through questionnaires, ethical consideration will play an important role in the data collection. The data collection was conducted in a fair manner and participants participated voluntarily. In plenary sessions the participants were informed about

the objective of the research and that participation is voluntary. The participants were also requested to all sign the undertaking that their participation is voluntary in line with Baker (1988:76).

The researcher used an introductory letter from the university in order to receive permission and to ensure voluntary participation. Anonymity and confidentiality of the respondents was ensured, and their privacy was guaranteed. The clearance and authorisation by the responsible person was obtained in writing before the survey was conducted. Clearance number NWU-HS-2017-0134 was obtained from the North-West University.

4.6. Research methodology and sampling

The research was conducted with all six priests and eight parishes which participated. In each parish 20 congregant's questionnaires were issued resulting in a total of 160 questionnaires. Of the distributed questionnaires 80 were completed and returned. The response of the eight participating parishes was over 50% of the questionnaires distributed. The Roman Catholic Dean for the Emfuleni Diocese nominated a person who was engaging with the priest on my behalf and prepared meetings with participants for the researcher to address them. The following parishes participated in the research survey: Vereeniging, Rusterval, Zone 3, Zone 12, Zone 14, Palm Springs, Ennerdale and Beverly Hills. The reason for a total number of only six priests is because they are responsible for two parishes in most instances.

Sampling of respondents for the study was conducted using a non-probability quota sampling technique. The selection of the participants was done voluntarily as per the ethical standards noted above.

The sample included all genders, age groups, population groups, people from all classes and social statuses. The chosen research method was perceived to be suitable for the study, however, this does not guarantee unbiased results as raised by Baker (1988:159).

4.6.1. Structure of the questionnaires

Two separate questionnaires were designed for the congregation and priests respectively, and each divided into two sections; namely Section A and Section B. Section A requests biographical information from the respondents. This includes details such as gender, home

language, age, marital status, number of children (where applicable) and residence, among others. The demographic data is intended to give an overall picture of who the respondents are. In the data analysis, this information can assist in determining relationships (if any) between responses and respondents' demographics. In this way inferential statistics are used to arrive at conclusions. Section B of the questionnaires focuses on determining the respondents' perceptions, attitudes, values, beliefs, knowledge, feelings, opinions and participation in cultural mandate activities within their respective local churches in Emfuleni.

Questionnaire 1 targets priests of the Roman Catholic churches in Emfuleni. The questionnaire items assume that this section of the population is more knowledgeable than the rest, especially with regard to the doctrine of the church, the strategic focus on doctrine, the training curriculum, and the church's mission.

Questionnaire 2 targets the congregants of the Roman Catholic churches, including members serving at various structures of the church, to assess their awareness of their church's doctrine on the cultural mandate that focuses on care for the environment, and their awareness of environmental challenges facing their immediate community. The questionnaire will also assess their participation collectively and individually in various environmental forums in order to positively contribute to caring for water resources and the environment.

It is the researcher's assumption that the responses will reflect the doctrinal teaching and actions taken by the church to fulfil the local church's functions concerning the protection of creation and nature, with the focus on water.

4.6.2. Construction of the questionnaire

Some of the following guidelines, as suggested by Miller (1980:78-79) and Maree and Petersen (2016:179) were considered in the development of both questionnaires to be used in this study:

- The language used is at the same literacy level as that of the respondents – no slang or abbreviations.

- An effort will be made to choose words that have the same meaning for everyone.
- Ambiguity, a lack of precision or vagueness, was avoided by ensuring that the questions were clear.
- Sensitive questions that may be offensive were avoided.
- Long and ambiguous statements were avoided.
- Biased and leading statements or questions were avoided.

A list of statements was offered to both samples of the population, which focuses on the role of the local church with regard to knowledge, awareness and participation of the church in environmental issues, with a focus on water. The priests' questionnaire will have an additional category which focuses on the church's strategy. In this study, the local church is defined as a group of Christians at Roman Catholic churches who are under the guidance of the Roman Catholic priest. The statements in the questionnaires cover the following categories:

- Category 1: *Member's knowledge of the biblical mandate for caring for creation.*
Questionnaire items in this category are aimed at testing the respondents' knowledge and understanding of the local church's God-given mandate to care for creation.
- Category 2: *Members' awareness of the environmental issues the immediate community and the country are facing.*
Questionnaire items in this category include statements indicating the awareness of the current challenges the country faces regarding water supply, changes in rain patterns and the impact of water pollution on the environment.
- Category 3: *Members' participation and commitment to the protection of the environment by taking part as a church in dealing with such issues.* Questionnaire items in this category include statements indicating whether or not, and to what extent the local church is committed to protecting nature and the environment.
- Category 4 (applicable to priests only): *The church strategic focus to ensure that priest teaches the congregants on caring for the environment.* Questionnaire items in this category focus on the training and senior leaders' reinforcement on priests to drive the agenda of caring for the environment.

The statements representing these categories do not follow any specific order and were randomly placed in the questionnaires. The table below indicates the questions related to the different categories.

Table 4.1: Questions related to different categories

	Priests	Congregants
Awareness 2	4;8;20	7;11;12;14;15;16;17;
Participation 3	1;3;5;6;16;17;18;19	1;3;5;6;9;13;18;20
Biblical understanding 1	2;7;9;	2;4;8;10;19;
Strategy –training, programmes	10;11;12;13;14;15	

4.7. Validity and reliability

4.7.1. Validity

The validity of the questionnaire is ensured by using the results from the literature review presented in chapters 2 and 3. This is done in order to check whether the questions measure what they were meant to or not.

4.7.2. Reliability

The researcher tested the questionnaire with the study supervisor who assessed them in order to ensure that the results will be consistent and reliable. According to De Vos (2005:208) it is necessary for the researcher to approach experienced experts to source opinions and inputs that can be used in the research.

4.8. Data analysis

Data analysis was done by displaying information received from the responses through tables and bar graphs illustrating important results as questionnaire outcomes (Dunn 2010:299).

In this study the analysis and interpretation of data will firstly be related to the two categories of priests and congregations, followed by the interpretation and analysis of the questionnaire items. Written text will be used to communicate the outcomes of the research, and finally followed by an analysis and interpretation of the text.

4.9. Survey results and findings

The survey results were received from both priests and congregations. The questions were assessing various categories as indicated in table 4.6.1 above. The first part of the results focused on the demographics of the respondents and the second part on the responses of the participants. The results that will be discussed first will be that of the congregants and those of the priests will be looked into later.

4.10. Congregation data and results analysis

The following phase of data analysis is based on the literature review and the questionnaires that were designed to determine views and knowledge and to indicate the respondents' perceptions and understanding regarding the statements made in order to deduce the views they hold. The analysis will be used to reduce data, to make sense of it, and to interpret it so that the relations of the research problems can be studied and tested to draw conclusions (Fouché & Bartley, 2011:248-249).

4.10.1. Demographic information of congregants

Table 4.2: Age

	Frequency	Percent
20-25	6	7.3
26- 30	11	13.4

31-35	6	7.3
36-40	8	9.8
41-45	7	8.5
46-50	17	20.7
51-55	9	11.0
56 and above	11	13.4
No response	8	9.8
Total	82	100

Purpose: To determine the age distribution among survey participants

Results: Results are graphically represented in table 4.2.

Discussion: They appear to have been an even spread between various age brackets amongst the congregants that participated in the survey. No over representation by any age bracket is seen to healthy because the outcome reflects a balanced cross section amongst various age categories.

Table 4.3: Gender

	Frequency	Percent
Female	56	68.3
Male	18	22.0
Total	74	90.2
No response	8	9.8
Total	82	100.0

Purpose: To determine the gender distribution among survey participants

Results: Results are graphically represented in table 4.3.

Discussion: The majority of congregants that participated in the survey were female; 68% compared to 22% of male. 10% did not indicate their gender

Table 4.4: Ethnic group

	Frequency	Percent
African	70	85.4
Coloured	5	6.1
Total	75	91.5

No response	7	8.5
Total	82	100.0

Purpose: To determine the ethnic groups of participants in the survey

Results: Results are graphically represented in table 4.4.

Discussion: The majority of congregants that participated in the survey were Africans, at 85% compared to 6% coloured. 9% did not indicate any ethnic group.

Table 4.5: Home language

	Frequency	Percent
English	7	8.5
Sesotho	56	68.3
Afrikaans	1	1.2
IsiZulu	6	7.3
Setswana	1	1.2
Tshivenda	1	1.2
Xitsonga	2	2.4
Other	1	1.2

Total	75	91.5
No response	7	8.5
Total	82	100.0

Purpose: To determine languages spoken by congregants who participated in the survey

Results: Results are graphically represented in table 4.5.

Discussion: The majority of congregants that participated in the survey spoke Sesotho, at 68% compared to 9% English, and IsiZulu 7.3%. The remaining participants' lingua franca represents minorities in the communities surveyed. This fact also confirms the ethnicity of the participants in the survey.

Table 4.6: Residential area

	Frequency	Percent
Town	7	8.5
Township	67	81.7
Total	74	90.2
No responses	8	9.8
Total	82	100.0

Purpose: To investigate the residence of participants in the survey

Results: Results are graphically represented in table 4.6.

Discussion: The majority of the participants in the survey reside in townships, at 82% compared to 8% residing in town and 10% did not disclose their residence.

Table 4.7: Qualifications

	Frequency	Percent
Grade 1-5	1	1.2
Grade 6-9	5	6.1
Grade 10-12	18	22.0
Grade 12+ Certificate	19	23.2
Grade 12 + Diploma	14	17.1
Degree	10	12.2
Honours	3	3.7
Masters +	1	1.2
Total	71	86.6
No response	11	13.4
82	100.0	

Purpose: To determine education level of the participants

Results: Results are graphically represented in table 4.7.

Discussion: The **education level of the** congregants that participated in the survey were evenly spread with the majority having an education level between grade 10- grade 12 + Diploma.

Table 4.8: Employment

	Frequency	Percent
Employed	22	26.8
Unemployed	34	41.5
Self-employed	6	7.3
Employed part-time	5	6.1
Pensioner	6	7.3
Total	73	89.0
No response	9	11.0
Total	82	100.0

Purpose: To determine the employment status of the congregants who participated in the survey

Results: Results are graphically represented in table 4.8.

Discussion: It is interesting to note that the majority of the participants about 41.5% were unemployed. 26.8% were employed, 7.3% self-employed, 7.3 % pensioners, 6.1 employed on part-time, and 11% do not indicate their employment status.

Table 4.9: Monthly income

	Frequency	Percent
R0- R750	18	22.0
R750 – R1000	4	4.9
R1001 – R1500	6	7.3
R1501 – R2000	1	1.2
R2000- R2500	2	2.4
R2500- R3000	3	3.7
R3001- R5000	5	6.1
R5001 +	15	18.3
Total	54	65.9
No response	28	34.1
Total	82	100.0

Purpose: To determine the income levels of the participants

Results: Results are graphically represented in table 4.9.

Discussion: The high number of participants earned R750 and below, followed by those earning above R5 000. The combined percentage of 41.7% respondents earn between R751 - R4999.

Table 4.10: Position in church

	Frequency	Percent
Member	57	69.5
Elder/Deacon	1	1.2
Committee member	14	17.1
Other	1	1.2
Total	73	89.0
No response	9	11.0
Total	82	100.0

Purpose: To determine the position occupied by congregants who participated in the survey

Results: Results are graphically represented in table 4.10.

Discussion: It is interesting to note that the majority of participants in this survey are members, followed by 17.1% who serve in as members in various committees. A small number of approximately 1.2% serve as deacons and the another 1.2% serve in other structures.

4.11. Research results findings

As discussed earlier, the questionnaires were grouped into three categories, mainly awareness, participation and biblical understanding by congregants. The survey outcomes will be discussed for each question and overall category, with concluding findings then summarised for each category.

4.11.1. Awareness

The questionnaires were focusing on assessing the awareness levels of the congregants regarding water and water pollution related matters that affect the communities. The objective was to compare their awareness with their participation and biblical understanding of such matters.

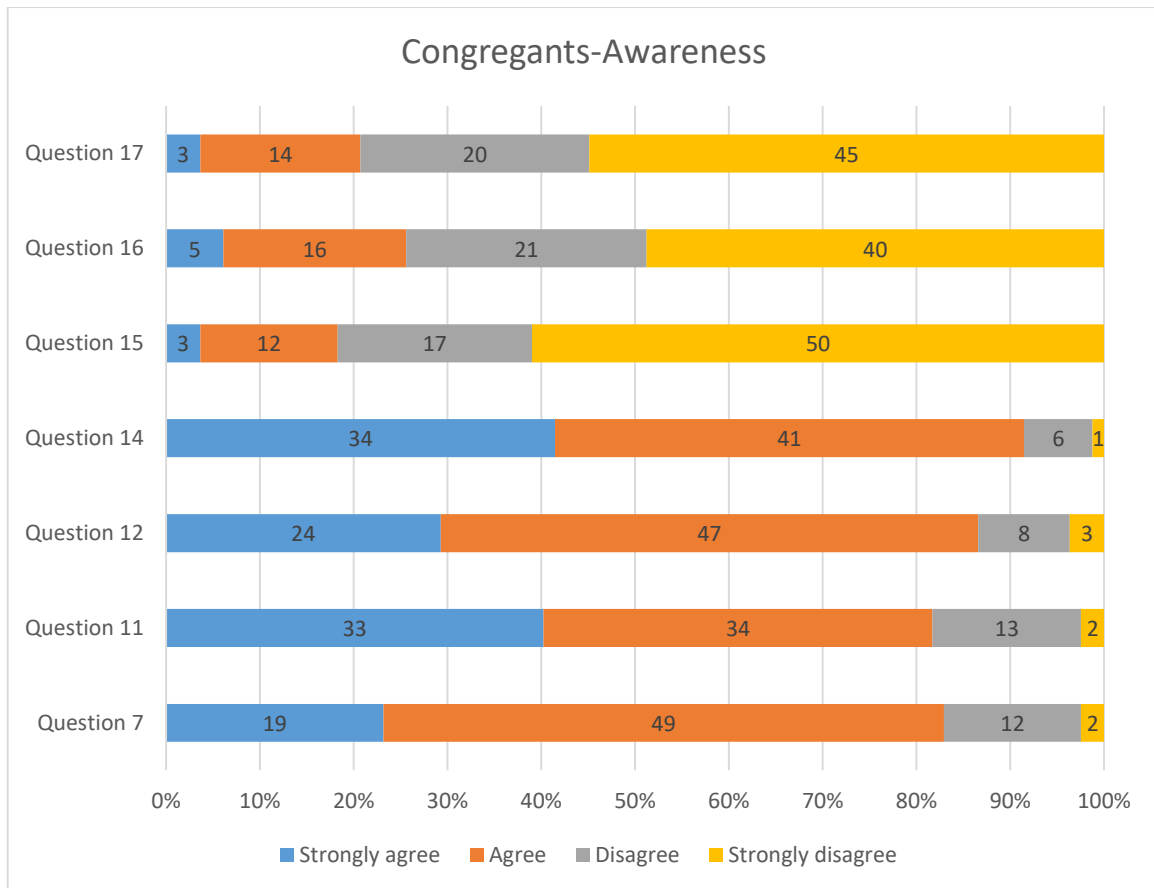


Figure 4.1: Awareness of congregants.

Question 7: The local assembly is directly affected by water-related issues – 82.9% responded that they are affected. This represents a healthy church which takes cognizance of her environment.

Question 11: I know individual members in our church who take part in environmental issues – 81.7% responded that they know other members of the church who are taking part in environmental issues. Once again a high number of members are aware of roles played by fellow congregants in environmental issues.

Question 12: I know individuals in our church who take part in matters of water pollution and conservation – 86.6% responded positively to an awareness of other church members

dealing with such matters and seems indicative that members have a high awareness of activities among other members and are conscious about water matters activism.

Question 14: Our church believes that it is affected by water issues in our country – surprisingly 91.5% responded that the church is affected which again shows that the church is fully aware of her environment.

Question 15: South Africa does not have water issues – 18.3 of respondents agree that South Africa do not have water issues, while 81.7% of respondents disagree meaning that they believe South Africa has water issues. The question may be dubious, however the reality is that South Africa has various water issues.

Question 16: What happens in our environment does not affect our church members – 25.7 of respondents agree that the church is not affected by what happens in their environment, while 74.3% responded that the church is affected by what happens in her environment. The high score indicates some readiness of congregants to participate in environmental matters because they believe they are personally affected. This seem to reflect a good understanding of the role of the church and the impact of environmental issues on the communities.

Questions 17: Emfuleni does not have water pollution problems – 79.2% responded that it does. This indicates that a vast majority of people in the congregations are aware of water and pollution challenges existing in their environment.

The awareness levels of participants surveyed almost averages 82.5% which indicates a very high level of awareness by the congregants of the water and pollution matters in their communities and country. The responses in this category will be compared with the responses in other categories to determine the extent of the role played by the church through biblical teachings and practices. The high scores in this section may be due to other factors, however,

the scores in the understanding of the biblical teachings and a strong biblical background seem to also include the church's teachings. It is on this basis that one may come to a conclusion that the church has also contributed to both awareness and participation of the congregants in water-related environmental issues.

4.11.2. Participation

In this category the questions were focusing on determining the respondent's action to practice what they have been taught in the church, and what they were aware of regarding water-related ethical matters. The outcomes will also be compared to those in the awareness and biblical teaching category, in order to determine correlation between the various categories. Results obtained by the questionnaires will be discussed below the graphical representation.

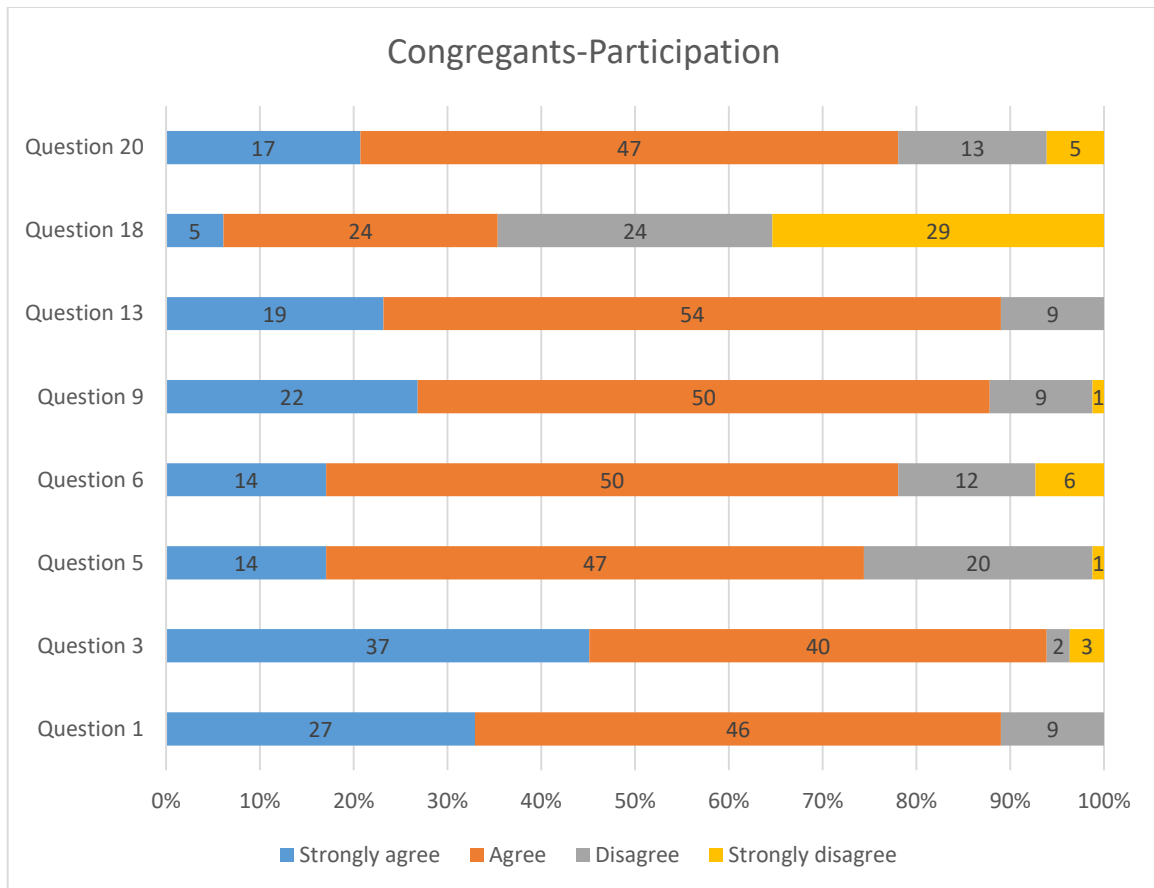


Figure 4.2: Participation of congregants.

Question 1: The local church is active in issues affecting water in the society – 89% responded that church is active in water issues in the society. This clearly indicates the teaching that is prevailing amongst various Priests.

Question 3: A good church is active in matters of water pollution – 93.9% responded that positively indicating that they value active participation by the church in water pollution matters.

Question 5: Members of the local assembly take part in community forum dealing with water issues – 74.4% responded that members from the local parish are actively participating in water issues.

Question 6: The effectiveness of local church is measured by its participation on water issues – 78.0% responded that effectiveness of local church can be measured by its participation in water issues.

Question 9: The local church participates in social environmental issues – 87.8% responded that their local church participates in social environmental issues.

Question 13: Our church teaches the community about environmental issues responsibility - 84.9% responded that the church teaches about environmental stewardship.

Question 18: The church is too small a group to create a meaningful impact on environmental problems that the communities face - 64.6% responded that the church can make a meaningful impact on environmental issues though it may be small relative to the community.

Question 20: Our church leadership is actively involved in water and environmental issues – 78.0% responded in a strong vote of confidence in the environmental activism by the leadership.

Amazingly, an average of 73% of the response in this category has indicated a strong participation in matters relating to water and water pollution. This clearly suggests that the teaching the congregants receive encourages participation in such matters. The participation responses correlate very well with the average of 75% in awareness responses. This may imply that the members may have a conviction that emanates from the teaching by the church on how human beings affect and impact the environment.

Finally these responses need to be correlated with the responses on their biblical understanding which will determine the source of their conviction if it is true that the above categories are mainly influenced by the church.

4.11.3. Biblical understanding

The questionnaire is meant also to assess the respondents' understanding of what the Bible teaches on water-related matters. This will further assess respondents' understanding of their biblical roles in water and water-related pollution based on the prevailing biblical teaching. This attempts to check the basic teachings offered by the church and how the respondents' received them. The value of this is to establish to what extent people live out their beliefs in their daily lives. It is suggested that strongly committed believers always live according to their conviction. Thus the outcome of the responses will be compared with that of participation which is a function of one's belief and conviction.

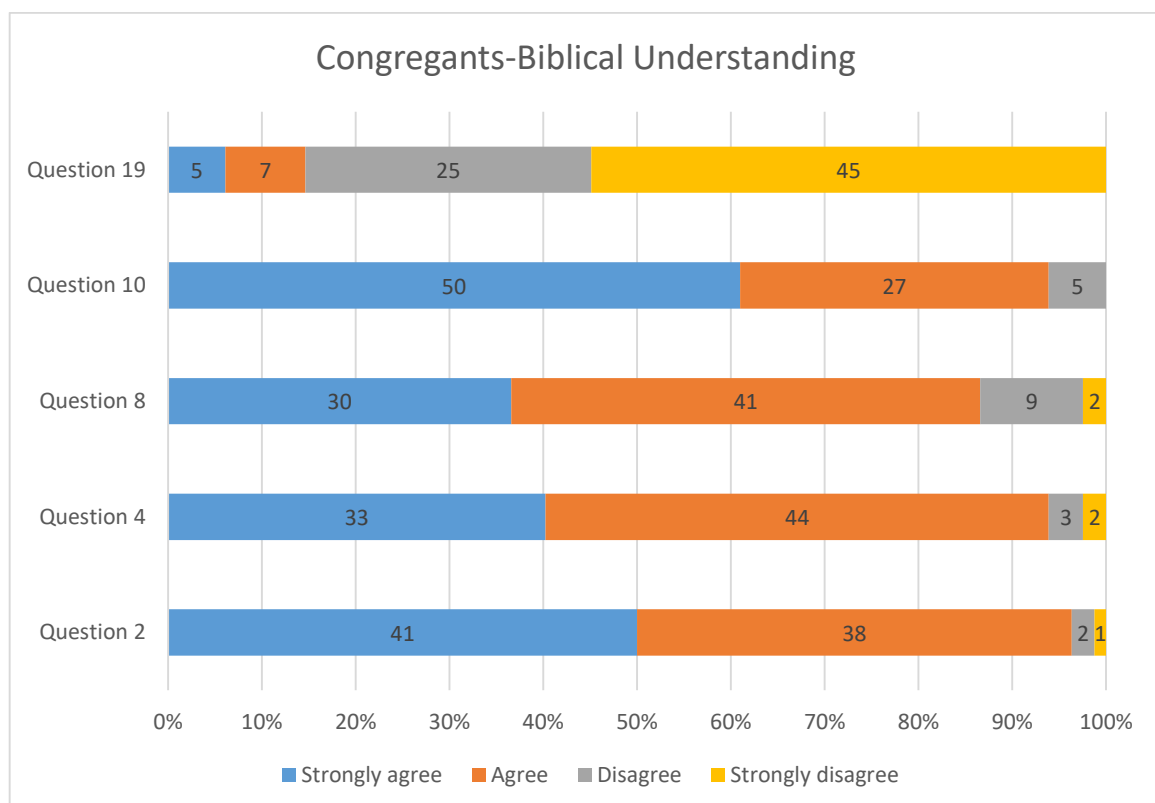


Figure 4.3: Biblical understanding of congregants.

Question 2: The church believes that God has given them the mandate to look after the earth's resources – 96.3% responded that they believe they have God-given mandate to look after the earth's resources. This indicates a very strong Biblical foundation to be active in caring for the earth's resources.

Question 4: The participation in water conservation and water pollution is for all members of the church – 93.9% believe that participation in water conservation and pollution is the responsibility of all members. This clearly shows the church is highly sensitive towards being active in water conservation and pollution.

Question 8: Our ministers have dedicated teachings on environmental issues – 86.6% responded that they receive dedicated teachings on environmental issues. This reflects a church with a clear teaching on environmental issues.

Question 10: The Bible teaches us that we should care for the environment, which include caring for water - 93.9% responded that caring for the environment is a biblical teaching.

Question 19: The ministers are the only people who can deal environmental issues – 85.4% responded not only ministers should deal with environmental issues. This clearly indicates the teaching that empowers all members to be environmental activists.

The high responses that averaged 91% indicates the concerted and conscious teachings by priests and other relevant structures of the church to ensure a proper understanding by believers of the biblical mandate to take care of creation which includes water-related matters. This clarifies the high scores related to awareness and participation above, which can now be ascribed to the teaching that is given to the congregations by priests and other role players in the Justice and Peace department of the church.

4.12. Final congregation outcome and conclusion

The outcomes of the awareness survey category and that of the biblical category are compared and correlated with that of reported participation by members. When compared, the outcome of awareness survey, namely that 75% of respondents are, and biblical teaching, namely that of 91% of respondents are with the actual participation outcomes of 72.9%, undoubtedly suggests that the teaching received from the church in various forms has resulted in these high scores by members of the church. This may also mean that the congregation puts huge effort in applying its biblical understanding and awareness on water and water-related pollution matters through participation in the community structures that discuss this matter. This outcome may also be reflecting the contribution by Justice and Peace desk of the church, which helps in educating the church informally of the significance of active participation in water-related matters in society.

The above finding will also be juxtaposed with the responses by the priests, which will be reviewed below. The purpose is to see if the responses of the priests correlate and corroborate the responses of the congregation.

4.13. Biographical information for priests

The section focuses on the profile of the priests and mainly on their age distribution, gender, ethnic groupings, residential area, qualifications, experience as priests and the sizes of their congregations.

Table 4.11: Age

	Frequency	Percent
30-35 years	2	33.3
41-50 years	2	33.3

51-59 years	1	16.7
60+ years	1	16.7
Total	6	100.0

Purpose: To determine the age of the priests participating in the survey

Results: Results are graphically represented in table 4.11.

Discussion: The above table indicates that the sample did not have a clear majority but the slight majority of priests were below 50 years of age.

Table 4.12: Gender

	Frequency	Percent
Male	6	100.0

Purpose: To determine the gender distribution of participants.

Results: Results are graphically represented in table 4.12.

Discussion: The participants were all male, and therefore the responses outcome may also indicate the gender bias.

Table 4.13: Ethnic group

	Frequency	Percent
African	3	50.0
White	2	33.3
Indian	1	16.7
Total	6	100.0

Purpose: To determine the ethnic groups of participants in the survey

Results: Results are graphically represented in table 4.13.

Discussion: The ethnic distribution was 50% Africans which is still in line with the national demographics where Africans are the majority. The 33% white representation and 16% Indian were not far from the national demographics.

Table 4.14: Residential area

	Frequency	Percent
Town	2	33.3
Township	4	66.7
Total	6	100.0

Purpose: To determine the residences of priests participating in the survey

Results: Results are graphically represented in table 4.14.

Discussion: The 67% majority of the priests are residing in the townships which is in line with the congregants' profile.

Table 4.15: Qualifications

	Frequency	Percent
Grade 12 + Diploma	1	16.7
Degree	4	66.7
Masters +	1	16.7
Total	6	100.0

Purpose: The objective was to determine the level of training either required or is applicable amongst the priests.

Results: Results are graphically represented in table 4.15.

Discussion: All the Priests have diploma and Degrees and higher qualifications with a minimum of three years of theological training. This clearly puts the church in a better position to having sound theological training and understanding.

Table 4.16: Years of formal studies

	Frequency	Percent
3-4 years	3	50.0
5 years and above	2	33.3
Total	5	83.3
System	1	16.7
Total	6	100.0

Purpose: To determine the extent of training formal training by priest.

Results: Results are graphically represented in table 4.16.

Discussion: 50% of Priests received 3 years and 33% received 5 years and higher formal theological training in participating Priests. 17% abstained from providing the information.

Table 4.17: Experience in ministry

	Frequency	Percent
4-6 years	2	33.3
11-15 years	1	16.7

16-20 years	1	16.7
20+ years	2	33.3
Total	6	100.0

Purpose: To determine the ministry experience levels amongst the participating priests

Results: Results are graphically represented in table 4.17.

Discussion: Interestingly 50% indicated the experience of above 4-15 years and other 50% indicated an experience of above 15 years. There were no new entrants in the ministry.

Table 4.18: Members

	Frequency	Percent
Below 100	1	16.7
301 – 500	2	33.3
700 +	3	50.0
Total	6	100.0

Purpose: To assess the parish sizes of the priests participating in in the survey.

Results: Results are graphically represented in table 4.18.

Discussion: The results indicated that the majority of parishes consisted of more than 300 members. This meant that participating parishes were not small but mostly medium size parishes.

4.14. Priests' Questionnaire responses

4.14.1. Awareness

The objective was to gauge on the awareness of priests on water and water pollution related issues. As opposed to the questionnaires of congregants, the focus was on awareness of local challenges as well as the national status on water and water pollution matters.

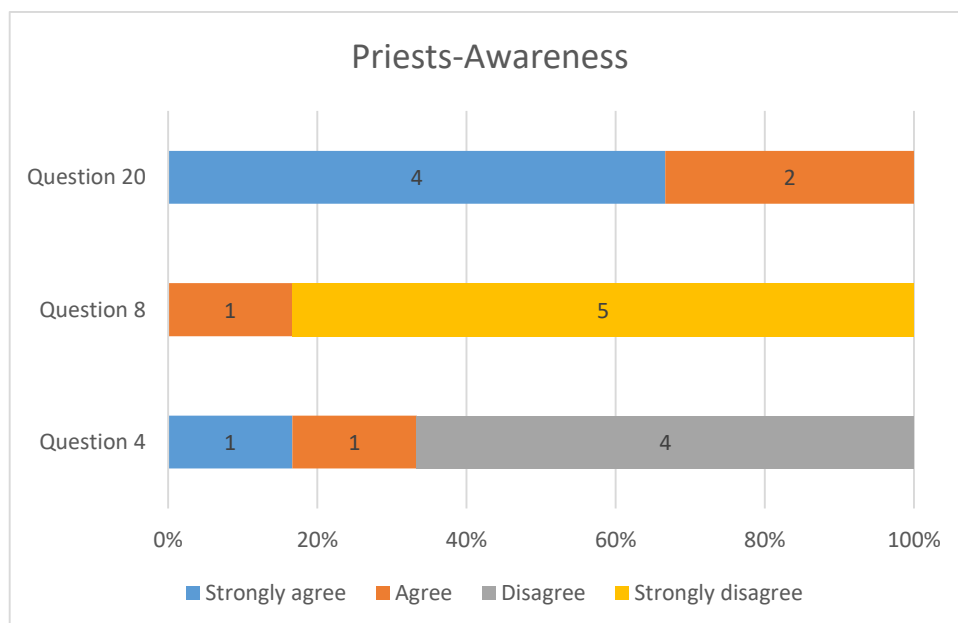


Figure 4.4: Awareness of priests

Question 4: Emfuleni Local Municipality is not facing water pollution issues – 16.7% responded that ELM is not facing water pollution issues, while the majority of 83.3% responded that ELM is facing water pollution issues. The majority response indicates that the priests are aware of community challenges facing their region.

Question 8: South Africa does not have water issues – 83.3% responded that South Africa does have water issues. The fact that there is still a priest/s that are not aware that South Africa

is having serious water issues is a concern particularly in the church where ordinary members have a high awareness level of environmental issues.

Question 20: South Africa is classified as water-scarce country – 100% responded that South Africa is a water-scarce country and this once again confirms the awareness level of the leadership about water issues and challenges in the country.

The average score of 88.8% was reached which is very high which indicates that priests themselves are aware, and hence the ability to teach and increase the awareness of their congregations.

4.14.2. Priests' participation

The object was to determine the level of participation by priests in water and water pollution related matters in their parishes through active biblical teaching, encouraging congregants to participate, observing special environmental days and weeks and encouraging their congregants to do the same. Hence, to determine their living by example in ensuring that their church is “green”.

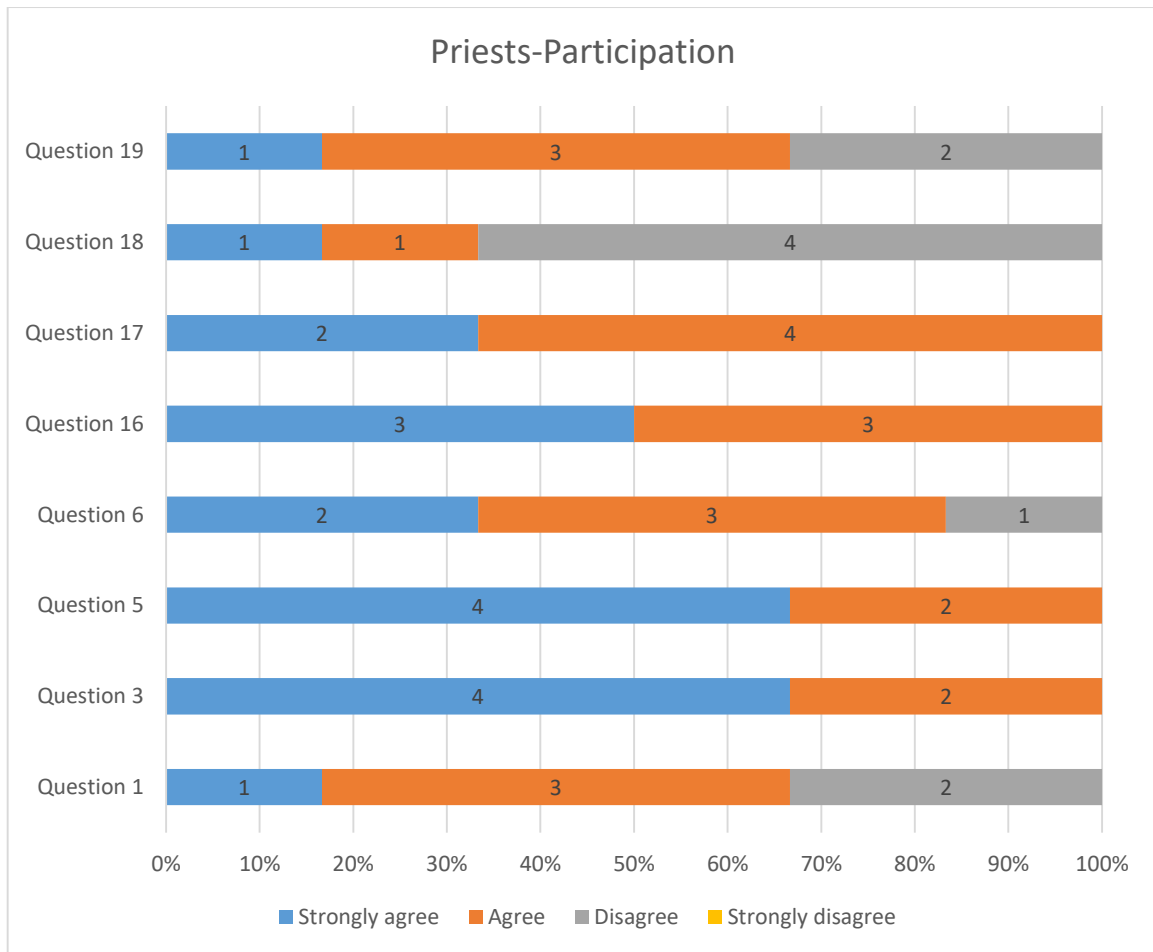


Figure 4.5: Participation of priests.

Question 1: The local church is active in issues affecting water in the society - Surprisingly, only 66.6% responded that their parish is active in issues affecting water in the society, though the question may be dubious as it may also be interpreted that they are negatively taking part. The lower score may be the feeling by some that they are not as active as they should be.

Question 3: The church has the structure for facilitating participation in environmental issues – 100% responded that the church structure assists in facilitating participation in environmental issues. This is indeed a strong indication of the existence of a dedicated structure to focus on Justice and Peace.

Question 5: I know individual members of the church who take part in water and environmental issues – 100% responded that they are aware of members who take part in water and environmental issues. This squares up with the responses from the churchgoers above.

Question 6: I know people in the church who take part in matters of water pollution and conservation - 83.3% responded that they know members in the parishes who participate in water pollution and conservation. Though the question may be unclear, responses to related question provide comfort that they understood it to be positively taking part.

Question 16: I encourage my church members to recognise and observe “Earth Hour” – 100% responded positively which is a good sign of an environmental conscious leadership which encourages congregants’ participation and awareness.

Question 17: The church is actively participating in the agenda for a green environment – 100% responded that they participate in the agenda for a green environment.

Question 18: Our church is “green” – that is, it takes steps to use renewable energy – The 66.6% negative response once again points to the gap by the church not to maximize green technology at their own premises to practice their own teachings in using “green” renewable energy. This may give the church the opportunity to improve this element of stewardship which is lacking. Once again, it is concerning that some ministers took steps in using renewable energy and did not invite the rest to join.

Question 19: Members in our church are encouraged to use “green” technology - In line with the above question, the 66.6% response further indicates an area for improvement even though the score remain relatively good. The high current costs of green technology may also

be the reason for the responses, alternatively there is a need to actively and consciously encourage congregants to use green technology.

The average score of the above section of 89.5% may be a reflection on the contribution of the priests by teaching and encouraging participation of congregants to take positive steps in addressing water and environmental related challenges in their immediate communities.

4.14.3. Priests’ biblical understanding

The biblical understanding of priests focused on what the priests believe and is very similar to the questions to that given to the congregants. The objective is to verify whether the priests and the congregants share similar a biblical understanding and beliefs. The responses will then be correlated with that of congregations to arrive at the conclusion.

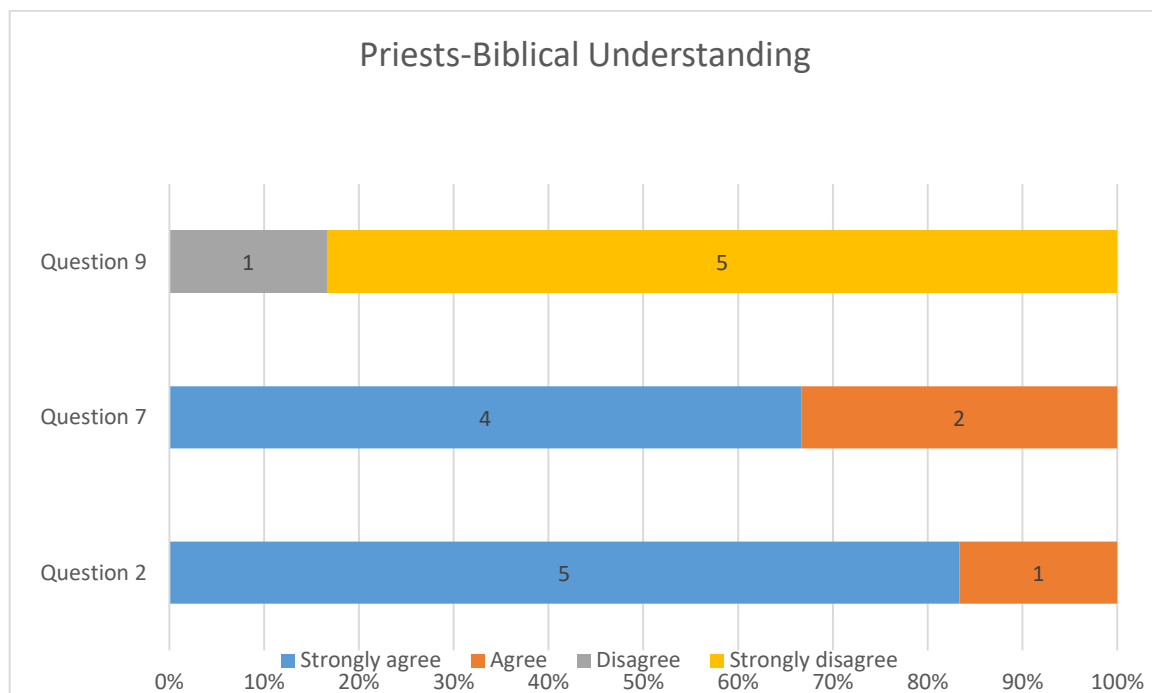


Figure 4.6: Biblical understanding of priests

Question 2: The church believes that God has given them mandate to look after the earth’s resources – 100% responded that God has given the church the mandate to look after the earth’s resources.

Question 7: The church believes that it is affected by the water issues in our country – 100% support that the church is affected by water issues.

Question 9: The ministers are the only people who must participate in challenges related to water – 16.7 responded that only priest must participate in challenges related to water, and 83.3% responded that they strongly disagree that water-related challenges are for ministers only. This is a reflection of what the priests would teach to their members, and it may be expected that all priests would believe that it is the responsibilities of all members to participate.

The priests' average of 94% in this category is compared with congregants' average of 91% to conclude that the congregation and the priests share a common biblical understanding and beliefs. This shows the leadership has a common focus and has a positive influence on the church in general.

4.14.4. Church strategy, priest training and programmes

The purpose of the questionnaires in this category is to determine the church strategy on caring for creation which includes water, as well as the relevance and intensity of training by looking at the years required for training priests. Secondly, to determine the degree of focus on the topic of caring for creation from the training and strategic church program perspective. Lastly, to look into the church strategic programs that support the caring for the environment and water to contribute to the sustainability of creation.

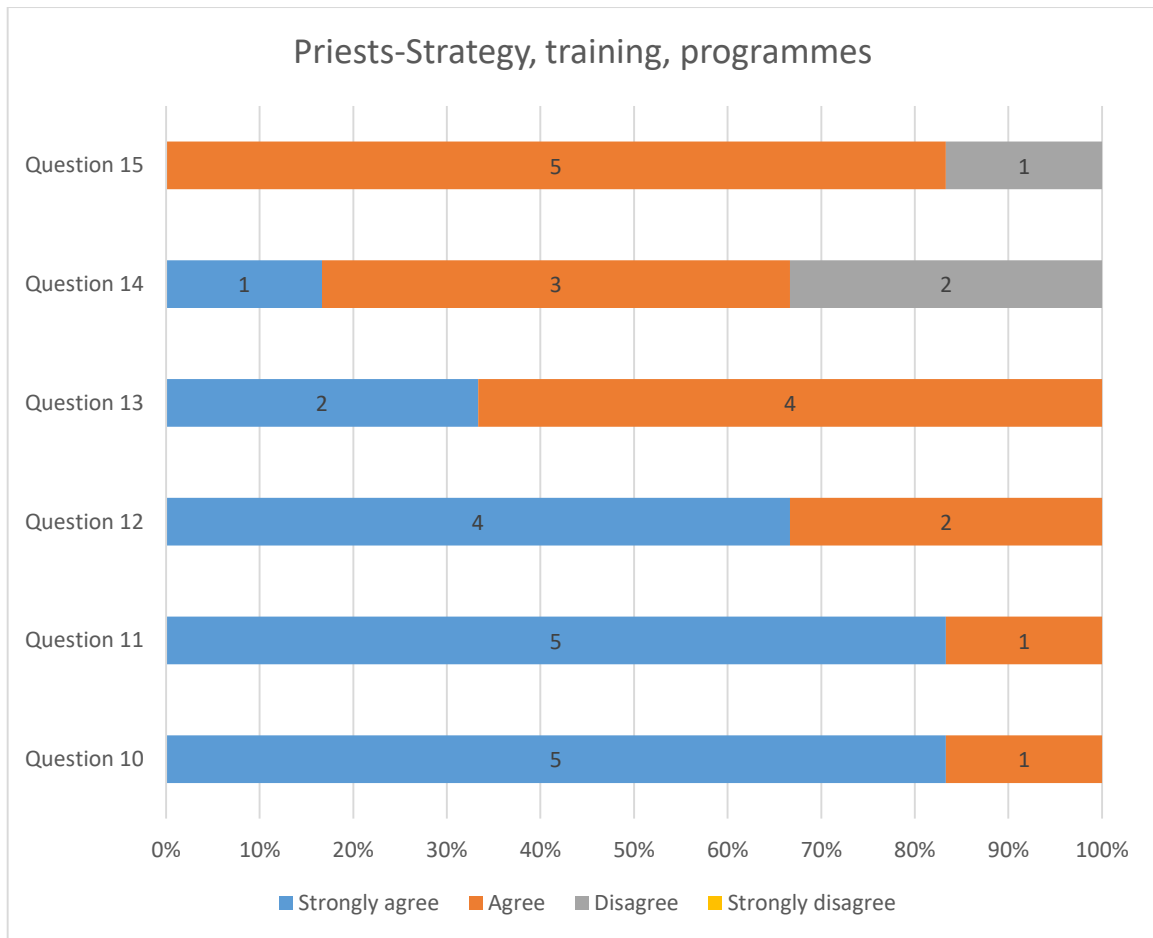


Figure 4.7: Priest – strategy, training and programmes.

Question 10: Caring for creation was part of my theological training – 100% responded that caring for creation was part of their theological training. This indicates that the church has a clear focus on caring for creation and thus trains and develops their priests appropriately.

Question 11: The church structure encourages that we teach about caring for creation - 100% agreed that it is expected of them by the church leadership to teach on caring for creation. Priests have a clear expectation that they have to teach the congregation about caring for creation, and this is attested to by the responses from the congregations on similar questions asked to them.

Question 12: Caring for creation is an integral part of leadership seminars – 100% responded that caring for creation is enforced in leadership seminars and retreats. The response highlights the strategic focus of the church which is a priority of the church.

Question 13: The leadership at various levels in our church participates in water and environmental issues – 100% responded that they participate in water and environmental issues. Good practice by the church leadership involves to be exemplary to the churches they lead. The response is corroborated by the congregants' responses to the questionnaires in the participation category.

Question 14: Environmental issues form part of our standard agenda in our church conferences – 66.6% responded positively, however the concern is when the responses still indicate people are not perceiving such practice. However, the score is still indicating that the church has a clear focus on environmental issues and challenges.

Question 15. My church communicates important environmental dates and events - 83% responded that important environmental dates and events are communicated. Once again the concern is that some priests, though in the minority, seem not to receive such communication. The overall message remains that the church takes effort in making congregations aware of important environmental dates.

The similar average response of 91.6% confirms that the senior church leadership structure is intentional in ensuring that the church participates in environmental issues. The focus can be seen through clear focused programs that encouraged awareness and participation in water and water pollution related matters.

4.14.5. Findings related to research aim 1

In the light of the literary review, research instruments in the form of questionnaires were developed to determine congregant's views from biblical, awareness, and participation

perspectives in line with the discussion in chapter 2 in relation to how the church can influence the caring for creation with the focus on water.

The majority of the participants were between the ages of 30-55 years. This does not represent a bias to any age group but have provided a fair spread. In terms of gender the majority is female with 68%, male is 22%, with 10.5% who did not disclose their gender. Africans were the majority of the participants with 85.4% and Coloureds 6% despite two parishes in towns participating in the survey. The absence of Indian and white groups in the survey cannot be explained but has been noted. The participants speaking Sesotho as home language were 68% of the total and this indicates that most participants were African. This is in line with Sesotho being a popular language in Emfuleni municipality (Stats SA, 2011). English (7%) is the second highest language spoken by the participants. The highest number of respondents (82%) was from townships while only 9.0% of respondents were from towns. The other 9% did not disclose their place of residence. Approximately 45% had matric a qualification plus certificate while 29% had diploma and degree qualifications. The other 29% had education levels below matric, with at the other end of the spectrum, 5% hold honours degrees and higher.

The unemployed participants constituted 42%, with only 27% of participants being employed. Pensioner and self-employed persons had 7% representation, and 6% indicated casual employment, while 11% did not disclose their employment status. The majority of participants (48%) earned less than R5000 per month and only 18% earned more than R5000, while the undisclosed figure stands at 34% and indicates a reluctance of participants to disclose their income. Finally, 70% of participants were ordinary church members, while 17% were committee members in the church. No feedback on this issue was received from 11% and 1% of participants were deacons in the church.

4.14.5.1. Congregants

a) Category 1: Congregants' awareness

In table 4.1 the raw scores of 83%; 82%, 83%; 93% on awareness reflect the church that is extremely aware of the environmental issues and is conscious that some fellow church members do take part in water-related environmental issues. The 98% awareness that Emfuleni has environmental problems, and 93% awareness that South Africa has water scarcity seal the awareness that the church has on water-related environmental issues. The congregants indicated high awareness levels with an average of 90% that unquestionably reflects high

awareness levels on water and water-related matters in their immediate environment as well as on national level.

b) Category 2: Congregants Participation

The responses indicated in the table 4.2 are generally far above 74%. The low score of 58.3% on question 18 has rendered the average for this category at 74%. However, if this question is excluded the perception of congregants about their participation remain fairly high with an average score of 83%. This shows a congregation that is upbeat about their participation as members in water-related matters in their community.

c) Category 3: Congregant's biblical understanding

Table 4.3 reflect an average score of 91% on biblical understanding by congregants. Indeed, such a high the score was not expected, especially from the congregation. This reflects a concerted effort to educate the congregation about the biblical doctrine for involvement in water-related matters. This further indicates a coherent biblical teaching by various priests on what the Bible teaches in this regard.

4.14.5.2. Research aim 2: Priests' questionnaire response

The second questionnaire focused on the views of the priests of the churches which participated in the survey. The purpose was to check if there is correlation between the views expressed by congregants and those expressed by the priests to evaluate if the teachings by priests are interpreted and applied by the congregants. The results could also be used to evaluate the effectiveness of CST on water-related teachings and consistency of teaching by various priests in the ELM.

The priests' age distribution was evenly spread through different age groups composed of 33.3% at 51 years and above, 33.3% between 41-50 years, and another 33.3% aged 31-40 years. The priests were 100% male and this reflects the general gender bias in the Roman Catholic Church towards men holding office, composed of 50% Africans, 33.3% Whites and 16.7% Indians. The priests who stay in townships are a majority at 67% and 33% stay in towns. All the priests have received a minimum theological training of three years with the majority (83.4%) having degrees and higher qualifications and 16.7% obtaining a three years diploma. The priests can be said to be adequately qualified from a theological training perspective. The

experience of priest is split in two with the one half having experience of between 4-15 year and those remaining from 16 years onwards. The four years minimum experience indicates fairly experienced priests. The majority of parishes has 700 plus congregants at 50% and 33.3% at 300-500 members, with 16.7% at 100 and below.

a) Category 1: Priests' awareness

The priest showed a high level of awareness of with an average of 94%. Figure 4.4 indicates that the priests scored 100% on awareness related to the pollution challenges in Emfuleni, and the classification of South Africa as water-scarce country. On whether South Africa is facing water challenges 83% indicated that it does, while one would anticipate that 100% should have responded in such a manner based on the water challenges facing the Western Cape at the time of the survey. The responses clearly indicate a good awareness among priests about environmental challenges related to water and water pollution in their local and national environments.

b) Category 2: Priests' Participation

The priests responded overwhelmingly at 66% that their congregation is not active in issues related to water, however the question is ambiguous and may have been answered from different understanding. This may also have been understood to mean that the church as unit participate in water issues and hence the low response. The priests, however, are 100% in agreement that they have a structure in the church that facilitate participation in environmental issues, and that they also know people in their parishes who participate in water and environmental issues. The responses in questions 3 and 4 seem to be in contrast to those at question 1. In question 6, 83% of the priests indicated to have knowledge of parishioners who participate in water and pollution matters. In figure 4.5 questions 16, 17 indicate 100% response that the priests encourage the congregation to observe earth hour and that the church participates in the green agenda. A total of 66% responded that the church is green and that they encourage parishioners to be green and this may indicate an area which the church needs to attend to, namely internal motivation for environmental issues. The overall responses reflect priests who encourage participation of parishioners in water and environmental issues and also who are conscious about participation of their members in such forums. The lower scores of 66.6% on questions 1 and 6 which both were checking for active participation by local church and taking practical steps by local church, may be reflecting the higher standards and

expectations of priests from their congregants and church leadership in general. It could be interesting to further explore the reasons that cause this underperformance. It must be noted that the costs to be green are currently prohibitive and may contribute to the poor responses related to church and congregants 'going green'.

c) Category 3: Priests' biblical understanding

The 100% response in figure 4.6 by priests that the Bible has given humans a mandate to look after creation, and that the church believes it is affected by water issues in our country in questions 2 and 7, shows a clear understanding and basis for biblical teaching. The 83% response that not only priests should be participating in the water-related issues clearly shows that they believe that all should be God's stewards on environmental issues. This can then conclude that the Bible is the base for the teaching of congregants to be activists for the environment.

d) Category 4: Priests' strategy, training and programs

The responses of 100% in question 10,11,12 and 13 in figure 4.7, which focused on caring for the environment as part of theological training, indicate that the church encourages teaching on caring for creation, organises leadership seminars encouraging caring for creation, and that the leadership of the church participates in water and environmental issues. The inclusion of environmental issues in the agendas of church conferences (66% and 83% response) shows that the church communicates important environmental events.

This section focused on looking at how the church strategically raises the significance of caring for the environment in their theological training and leadership conferences. The high average score of 92% highlights the critical role that the church strategy plays in reinforcing the significance of caring for the environment.

4.15. Final conclusion

The results from the empirical research results on congregation and priests questionnaires in the ELM, seem to indicate that the Roman Catholic Church in ELM contributes to the education and motivation of congregants in taking part in environmental matters on water as indicated in research aim 1 and 2. The conclusion based on the categories as discussed above, is that both the congregants and the priests have the same general understanding related to the categories

of awareness, biblical understanding, and participation of the church in water-related issues. The categories related to strategy and training programs clearly show that the Roman Catholic Church is strategically focusing on equipping the church to understand its biblical mandate, be aware and participate in water-related environmental issues.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The study focused on the role the church in ELM plays in matters relating to water and water pollution in this area. The aim was to give the current views from a scientific theoretical basis from water environment, biblical framework related to water, theological concepts and ethical principles related to water as discussed in chapter 2. This formed the basis of the questionnaires which were intended to evaluate the church in ELM to determine the degree of awareness, participation and biblical understanding of the church in the area related to the identified problem field. An initial intention to involve all churches became too broad for the study of this nature thus the limited scope of the research on only the Roman Catholic churches in ELM as stated in chapter 4. This focused mainly on factors of significance to the research such as rivers within the environment, water treatment plants, environmental court judgements and NGO's of significance in the area as well as a brief introduction of the church development in this area.

Although the research was intended for the broader Christian community in this area, based on the responses by the priests and congregants, it seems that the responses from various churches would differ because based on contribution from their teaching, structure and mission of the Church contributed on the scores especially on the biblical understanding and strategy, training and programs dimension. The results of congregants and priests/leaders must correlate on similar questions, and also on the scores from priests on the church strategy, training and meeting agenda will be the differentiating factor between churches.

The Roman Catholic churches viewed the importance of the focused teaching on the biblical mandate, to bring awareness and participation of congregations in water-related environmental issues. The findings will be the basis of recommendations on how the churches may improve the awareness, participation and biblical understanding of their congregations on water-related environmental issues. The focus will be mainly on the critical factors of the study found in the literature review and the questionnaires responses of the Roman Catholic churches in the ELM in assessing their involvement in water-related environmental issues.

5.2. Conclusion

In conclusion of this research, the outcome should not be taken to be the position of the entire Christian Church but is limited to that of Roman Catholic churches in ELM. The questionnaires were designed to assess among other the biblical teaching, understanding of the biblical mandate as the basis of behaviour. The preparation of priests in their training this instance was assessed to check the significance of such training in teaching the church about the importance and value of the cultural mandate.

The conclusions made in this research may be used as a basis for the churches to identify and learn what strategies to follow to increase the awareness, participation and biblical understanding of the churches regarding environmental issues with the focus on water. These will be based on some critical aspects for the church to improve environmental awareness with the focus on water. These principles may be applicable to all other matters regarding the protection and preservation of the earth as part of humans in fulfilling a God-given biblical mandate. As stated in chapter 4, the existence of Catholic Social Teaching was the reason for choosing the Roman Catholic Church, and the significance of CST in the responses can be recognised in responses on biblical understanding questionnaires which focused on the understanding of the Bible teaching on this matter. The questionnaire categories for both priests and congregations were similar except one category of strategy and training which was only applicable to priests. The recommendation will be focused on an overall approach that will contribute to improved awareness and participation by both congregations and priests.

5.3. Recommendations

5.3.1. Participation and awareness is the result of biblical understanding

Based on the empirical research findings in chapter 4, the Roman Catholic congregants are actively participating in water-related environmental issues in their communities. In the section dealing with the biblical mandate, it is clear that there is high correlation between the biblical understanding of the cultural mandate and the high awareness and participation in environmental issues. The research was mainly focused on water but may be similar for any other environmental challenges as well in light of the broad biblical foundation. The church understands that the Bible expects her to participate in matters of water pollution. The findings in chapter 4 clearly reflected that the Roman Catholic churches have a clear understanding of their biblical mandate. The high score of both priests and congregation were influenced by

dedicated teaching from the church on this topic. It is recommended that all churches should consider consciously teaching their parishioners about what the Bible teaches on their biblical cultural mandate.

5.3.2. The Church's strategy to be intentional on encouraging teaching on environmental issues

The research found that the Roman Catholic Church leadership is intentional on various levels to teach and encourage active participation by all in matters concerning water. The focus on environmental issues on various levels throughout the church is pivotal in the high awareness and participation in environmental issues with focus on water. The literature available does not indicate that other churches have a dedicated teaching like CST as is the case with the Roman Catholic Church, which sharpens and challenges members to participate in environmental issues such as water-related matters. The Roman Catholic Church has an office in its structure that is responsible for "Justice and Peace" which drives the church on matters of environmental care. Churches that aspire to improve their awareness and participation in environmental issues may consider having a clear strategy, teaching, strategic focus and create an office to improve the congregations' involvement in environmental matters in line with the church doctrine.

5.3.3. Catholic Social Teaching (CST)

The focused CST seems to have contributed greatly in improving the biblical understanding of congregants regarding the biblical cultural mandate to take care of the environment. The observation is that focused teaching with dedicated teams for peer education may have contributed to the high awareness and participation of the congregations. The congregations participate in various forums with the understanding that they are partly fulfilling their God-given mandate to care and protect the environment including water-related matters. The CST provides a platform for in depth study by congregations. It is therefore recommended that a "catechism on cultural mandate" or similar be designed to focus on caring for the environment and be implemented for teaching to raise better awareness and participation results.

5.3.4. Clear strategy to be adopted by church leadership

The church should follow a clear strategy to ensure that environmental issues are taken to heart by priests or church leaders. The following considerations and recommendations are proposed:

- Priests/leaders to proper training on the biblical cultural mandate as part of their training.
- Seminars/meetings should always have as one of the topics a presentation on caring for creation.
- Priests/leaders are further reminded about critical environmental calendar days with clear programs for each throughout the church.

5.4. Limitations of the study

The scope of this study was limited to the Roman Catholic churches in ELM, and only questionnaires were applied. The findings of this research may only be generalised amongst the Roman Catholic churches due to geographical dynamics which may be applicable taking the content of chapter 3.

5.5. Suggestions for further studies

The researcher suggests that further studies on this topic be conducted in the same geographic area but with other churches to verify whether the structure of the church, teaching and biblical understanding has an influence on the outcomes. Secondly, further studies within the Roman Catholic churches but in a different geographic area without any history of pollution as is the case with ELM should be conducted to verify some of the results. Lastly that a comparative study be conducted to identify key factors critical in changing the church's attitude and increasing participation in water-related environmental issues.

BIBLIOGRAPHY

Ayre, C.W.2014. *Where on earth is the Church? Theological reflection on the nature, mission, governance and ministry of the Church amidst the global environmental crisis.* (In Conradie, E., Bergmann, S., Deane-Drummond, C. and Edwards, D. eds. *Christian faith and the Earth.* London: Bloomsbury. pp. 137-156.)

Baker, T.L. 1988. *Doing social research.* New York: McGraw-Hill.

Barram, M.2018. *Missional Economics. Biblical Justice and Christian Formation.* Michigan:Eerdmans

Bauckham, R. 2011. *Living with Other Creatures: Green Exegesis and Theology.* Waco: Baylor University Press

Bega, S. 2019. *Vaal River pollution dangerous for all life.* IOL Travel. <https://www.iol.co.za/travel/travel-news/vaal-river-pollution-dangerous-for-all-life-11329720>. Date of access 25 May 2019.

Best, J.W. and Kahn, J.V. 2003. *Research in education.* Boston: Allyn and Bacon.

Bouma-Prediger, S. 1995. *The greening of theology: the ecological models of Rosemary Radford Ruether, Joseph Sittler, and Jurgen Moltmann.* Atlanta: Scholars Press.

Bradley, I. 2012. *Water: A Spiritual History.* Bloomsbury. London.

Butkus, R. and Kolmes, S. 2011. *Environmental science and theology in dialogue.* Maryknoll, NY: Orbis Books.

Caleb, S.M.2007. *The use of water as metaphor and symbol in Biblical Theology: An Exploration.* (In John, V. *Water struggle.* Kolkata: Bishop's College, pp.69-79).

Carson, R. 2002. *Silent spring.* New York:Mariner Books (Houghton Mifflin).

Center for Environmental Right (2019). *Stop* <https://cer.org.za/wp-content/uploads/2012/03/Stop-Treading-Water.pdf> Date of access 22 July 2019.

Claasen, M. 2010. *How much water do we have? A CSIR perspective on water in South Africa.*p.4-7.

https://researchspace.csir.co.za/dspace/bitstream/handle/10204/5760/Wall11_2010.pdf? Date of access 27 June 2016.

Cohen, L., Manion, L. and Morrison, K. 2001. *Research methods in education*. London: Routledge Falmer.

Conradie, E. M. 2004. *Towards an ecological Biblical hermeneutics: A review essay on the Earth Bible Project*. *Scriptura*, 85:123 – 135.

Conradie, E. M. 2006. *Christian and Ecological Theology Resources for further research*. (Study guides in religion and theology 11.) Stellenbosch: Sun Press.

Conradie, E. M. 2010. *What on earth is an ecological hermeneutics? Some broad parameters*. (In Horrell, D. G., Hunt, C., Southgate, C. and Stavrakopoulou, F. eds. *Ecological hermeneutics. Biblical, historical and theological perspectives*. London: T & T Clark International. pp. 295 – 313).

Conradie, E.M. 2011. *Christianity and Earth Keeping. In search of an inspiring vision*. Stellenbosch: Sunpress

Conradie, E.M. 2017. *Redeeming Sin? Social Diagnostics amid Ecological Destruction*. Lexington books. London

Creswell, J.W. 1994. *Research design: qualitative and quantitative approaches*. Thousand Oaks, California: Sage Publications.

Dane, F. C. 2010. *Evaluating research: methodology for people who need to read research*. Thousand Oaks, California: Sage Publications.

Delport, C.S. L. 2005. *Quantitative and data collection methods* (In de Vos, A.S. ed. *Research at grassroots for the Social Sciences and human service professions*. Pretoria: Van Schaik. pp. 159-191).

Delport, C.S. L. and Roestenburg, W.J.H. 2011. *Quantitative and data collection methods*. (In De Vos, A.S. Fourth ed. *Research at grassroots for the social sciences and human service professions*. Pretoria: Van Schaik. pp. 171-205).

Denzin, N.K. and Lincoln, Y.S. 2005. *The SAGE handbook of qualitative research*. Thousand Oaks, California: Sage Publications.

DesJardins, J.R. & McCall, J.J. 2005. *Contemporary issues in business ethics*. Thomson: Wadsworth.

De Vos, A. 2005. *Qualitative data analysis and interpretation* (In de Vos A.S. ed. *Research at grass roots. For the social sciences and human service professions 3rd ed.*, Pretoria, South Africa: Van Schaik. pp. 333–349).

Dunn, D.S. 2010. *The practical research: A student guide to conducting psychological research*. 2nd ed. Moravian College:Wiley- Blackwell.

Emfuleni Local Municipality. 2007. *Emfuleni Local Municipality Draft Integrated Development Plan 2007/08*. <http://www.emfuleni.gov.za/index.php/documents-77289/integrated-development-plan.html> Date of access 10 May 2016.

Emfuleni Local Municipality. 2009. *Environment Management – Integrated Environmental Policy document*. <http://www.emfuleni.gov.za/index.php/documents-77289/integrated-development-plan.html>. Date of access 29 July 2016.

Emfuleni Local Municipality. 2016. *Emfuleni Local Municipality – Annual Report 2016/17*. <http://www.emfuleni.gov.za/index.php/documents-77289/integrated-development-plan.html> Date of access 26 July 2016.

Emfuleni Local Municipality. 2017. *Emfuleni Local Municipality - Annual Report 2017/18*. <http://www.emfuleni.gov.za/index.php/documents-77289/integrated-development-plan.html> Date of access 12 June 2016.

Emfuleni Local Municipality.. 2019. *Emfuleni Local Municipality - Integrated Development Plan 2019/20*. <http://www.emfuleni.gov.za/index.php/documents-77289/integrated-development-plan.html>. Date of accessed 22 October. 2019.

Fedler, K.D. 2006. *Exploring Christian ethics: biblical foundations for morality*. Louisville: John Knox Press.

Fouche, C.B. and Bartley, A. 2011. *Quantitative and data collection methods*. (In De Vos, A.S. Fourth ed. *Research at grassroots for the social sciences and human service professions*. Pretoria: Van Schaik, pp. 248-276).

Gauteng (South Africa). 2004. *Water and sanitation bylaws*. (Notice 804 of 2004). Provincial Gazette, 183:3, 21 May.

Gouws, C.M., Gouws, C., Mathipa, R., Motumi, K., Tempelhoff, J.W.N. and Viljoen, M. 2007. *Vaal River Barrage project report no. 3/2007 – Perspectives on Emfuleni's aquatic commons: a qualitative study on the Vaal River Barrage*. Vanderbijlpark: North-West University.

Habel, N. C. 2009. *An inconvenient text. Is a green reading of the Bible possible?* Adelaide: ATF Press.

Habel, N. C. and Trudinger, P. 2008. *Exploring ecological hermeneutics*. Atlanta: Society of Biblical Literature.

Habel, N.C. and Wurst, S.2000. *The Earth Story in Genesis*. Sheffield Academic. Sheffield

Hembron, T. 2007. *Significance of Water in the Old Testament*. (In John, V. Water struggle. Kolkata: Bishop's College, pp.49-56).

Hill, B.R. 2007. *Christian faith and environment: making vital connections*. New York: Orbis Books.

Horrell, D. G. 2010 *The Bible and the environment. Towards a critical ecological Biblical theology*. London: Equinox Publishing Ltd.

Horrell, D. G., Hunt, C., Southgate, C. and Stavrakopoulou, F. 2010. *Ecological hermeneutics. Biblical, historical and theological perspectives*. London: T&T Clark International.

IPCC. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (In Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor M. and Miller, H.L. eds. Cambridge, United Kingdom and New York, NY, USA: Cambridge

University Press. 996 p.). <https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-frontmatter.pdf>. Date of access 8 May 2019.

IPCC. 2018. Summary for Policymakers. (In Masson-Delmotte, V., Zhai, P., Pörtner, H.O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T., Tignor, M. and Waterfield, T. eds. *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Geneva: World Meteorological Organization, 32p.).

Jiménez Cisneros, B.E., Oki, T., Arnell, N.W., Benito, G., Cogley, J.G., Döll, P., Jiang, T. and Mwakalila, S.S. 2014. *Freshwater resources*. (In: Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. and White, L.L., eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press, pp. 229-269).

https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap3_FINAL.pdf Date of access 14 May 2019.

Jones, L. 1997. *The symbol of water in the Gospel of John*. Sheffield: Sheffield Acad. Press.

Joseph, M.J. 2008. *The Eco-Vision of the Earth community*. (Biblical and Theological Perspectives). Bangalore: BTESSC/SATHRI

Kings, S. 2018. *The Vaal remains up shit creek*. The M&G Online. Available at: <https://mg.co.za/article/2018-08-24-00-the-vaal-remains-up-shit-creek>. Date of accessed 28 May 2019.

Kinsley, D. 1995. *Ecology and religion: ecological spirituality in cross-cultural perspective*. New Jersey: Prentice Hall.

Lawrence, J. 2006. *Washing in water*. Atlanta: Soc. of Biblical Literature.

- Leedy, P.D. and Ormrod, J.E. 2005. *Practical research: planning and design*. Upper Saddle River, N.J.: Pearson Merrill Prentice Hall.
- Leigh, R.L. 1968. *Vereeniging, South Africa, 1892–1967: the story of a South African town recording its growth during 75 years from a riverside colliery village to a major centre of the Republic's industry*. Johannesburg: Courier-Gazette Publishers.
- Liebenberg, R.J. 1993. *South Africa in the 20th century*. Pretoria: Van Schaik.
- Lockwood, C. 2017. *Hagiasmos: Water Symbolism in Orthodox Christianity*. (In SVS Press & Bookstore. 2017. *St. Vladimir's Theological Quarterly* (Vol. 61, no. 1 - 2017). <https://svspress.com/st-vladimirs-theological-quarterly-vol-61-no-1-2017-1/>. Date of access 22 October 2019.
- Manslin, M. 2007. *Global warming. Causes, effects, and the future*. Updated edition. St Paul: Voyageur Press.
- Maree, K. and Pietersen, J. 2016. *Surveys and the use of questionnaires*. (In Maree, K ed. *First steps in research*. 2nd ed. Pretoria: Van Schaik: pp. 173-190).
- Meyer, L and Strauss, J. 2014. *Historic Environmental Education – Vaal River Tunnels: The Forgotten History of the early days of coal in Vereeniging area; NWU*. Yesterday & Today journal, No. 12, December 2014, 128-139).
- Miller, C. J. 1980. *Evangelism and your church*. Phillipsburg, New Jersey: Presbyterian and Reformed Publishing Company.
- Mouton, J. 2001. *How to succeed in your master's and doctoral studies: A South African guide and resource book*. Pretoria: Van Schaik.
- Mohapi, M.P. 2008. *Towards an Appropriate Model of the Local Church In the Vaal Triangle Master's Dissertation*. Potchefstroom: PU for CHE.
- Moses, Y. 2017. *Perspectives on Water and the Bible*. (In Scriptures, W., Raju, K., Manasi, S. *Water and Scriptures - Ancient Roots for Sustainable Development*) <https://www.springer.com/gp/book/9783319505619>. Date of accessed 2 October 2019.

Mukheibir, P. and Sparks, D. 2006. *Climate variability, climate change and water resource strategies for small municipalities*. (Report to Water Research Commission).

<http://www.wrc.org.za/wp-content/uploads/mdocs/1500-1-061.pdf>. Date of access: 25 September 2019.

Noonan, P. 2003. *They're burning the churches: the final dramatic events that scuttled apartheid*. Durban: Jacana.

Northcott, M. S. 1996. *The Environment and Christian ethics*. Cambridge: Cambridge University Press.

Nothwehr, D. M. 2012. *Ecological Footprints. Essential Guide for Franciscan Faith and sustainable Living*. Minnesota: Liturgical Press.

Northcott, M.S. 1996. *The environment and Christian ethics*. Cambridge: Cambridge University Press.

Parliamentary Monitoring Group. 2015. *Report of the portfolio committee on water and sanitation on an oversight visit to Gauteng Province 4-4 February 2015*, dated 19 August 2015. <https://pmg.org.za/taled-committee-report/2486/> Date of access 15 July 2018.

Peppard, C. Z. 2014. *Just water: Theology, ethics, and the global water crisis*. Maryknoll: Orbis Books.

Plantinga, C. 2002. *Engaging God's world: A Christian vision of faith, learning, and living*, Grand Rapids: Eerdmans Publishing.

Prinsloo, J.J. 1994. *'n Historiese Oorsig van die Vaaldriehoekse Industrialisasieproses, 1880-1950*. Potchefstroomse Universiteit vir Christelike Hoer Onderwys. Vaaldriehoekskampus.

Quebert, M. 2010. *Water for life: Global Fresh Water resources*. (In Toly, N. J. and D. I. Block. eds. *Keeping God's earth: the global environment in biblical perspective*, Downers Grove: InterVarsity Press. pp 43-164).

Rand Water, 2019. *Water information centre for the Vaal Barrage and Vaal Dam Catchment forums*. <http://www.reservoir.co.za/index.htm>. Date of access 27 Jun. 2019.

- Rich, N. 2019. *What failure to reverse climate change could mean*. Daily Maverick. <https://www.dailymaverick.co.za/article/2019-05-27-what-failure-to-reverse-climate-change-could-mean/> Date of access 28 May 2019.
- SABC. 2017. *Health Talk, Environmental Health*: Date of access 25 February 2017. <https://www.youtube.com/watch?v=Dr52pdnpH4Q> Date of access 4 October 2019.
- SAEON. 2017. *Welcome to our website*. <http://www.saeon.ac.za/>. Date of access 29 May 2017
- SAFCEI. 2017. *Southern African Faith Communities Environment Institute*. <https://safcei.org/>. Date of access 30 April 2017]
- Salim Thanka Kumar, T.P. 2015. *Eco-Theological Significance of Water: A critique on Privatisation in the Indian Socio-Economic Milieu*. Christian World Imprints, New Delhi.
- Save the Vaal Environment. 2013. *About SAVE*. <http://www.save.org.za/content/about-save>. Date of access 24 June 2018.
- Scholes, B.; Scholes, M.; and Lucas, M. 2015. *Climate Change: Briefings from Southern Africa*. Wits University Press, Johannesburg.
- Scott, P. 2003. *A Political Theology of Nature*. Cambridge: Cambridge University Press.
- South Africa. 1996. Constitution of the Republic of South Africa 1996.
- South Africa. 1998. National Environmental Management Act 17 of 1998.
- South Africa. 1998. National Water Act 36 of 1998.
- South Africa 1999. Department of Environmental Affairs and Development Planning.
- Statistics South Africa. 2011. *Statistics by place: Emfuleni local municipality*. http://www.statssa.gov.za/?page_id=993&id=emfuleni-municipality#people. Date of accessed 29 June 2018:
- South Africa. 2018. *Department of Environmental Affairs and Development Planning. Western Cape climate change response strategy 2nd biennial monitoring & evaluation report 2017/18. Progress in preparing for climate change March 2018*.

https://www.westerncape.gov.za/eadp/files/atoms/files/WC%20Climate%20Change%20Response%20Strategy%20Biennial%20M%26E%20Report%20%282017-18%29_1.pdf. Date of access 14 March 2019]

Tempelhoff, J., Munik, V. and Viljoen, M. 2007. *The Vaal River Barrage, South Africa's hardest-working waterway: a historical contemplation*. Journal for Transdisciplinary Research in Southern Africa, 3(1):107-133.

Unesco2009. *Water in a Changing World* | United Nations Educational, Scientific and Cultural Organization. <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/wwdr3-2009/>. Date of access 22 August 2018.

Unesco2018 - *Nature-based Solutions* | United Nations Educational, Scientific and Cultural Organization. <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/2018-nature-based-solutions/>. Date of access 15 August 2018.

Vaal Environmental Justice Alliance. 2016. *Vaal River system*. <http://vejaenvironment.blogspot.com/2016/11/vaal-river-system-vaal-river-passing.html>. Date of access 24 June 2016.

Van Deventer, H. J. M. 1996. 'n "Groen" Israel – ekologiese rigtingwysers uit Levitikus 25: 1 - 7? In die Skriflig, 30 (2):185 – 201.

Van Dyke, F., Mahan, D.C., Sheldon, J.K. and Brand, R.H. 1996. *Redeeming creation: the biblical basis for environmental stewardship*. Downers Grove: InterVarsity Press.

Van Zyl, M.E. 1993. *Swart Verstedeliking in Vereeniging 1923–1960*. Vanderbijlpark: Vista Universiteit. (Proefskrif –PhD).

Vayalil, J.M, 2018. *The Green model of the Church. A Theological Response to the Modern Ecological crisis for a Meaningful Social Change*. Christian World Imprints:New Delhi:

Victus, S.2014. *Eco-Theology and the Scriptures: A revisit of Christian Responses*. New Delhi: Christian World Imprints.

Vodo, T. 2016. *Faith-Based Organisations. The role of Christian Organizations to Social Cohesion in EU Member States*. European Christian Political Movement [online] Available at: <https://ecpm.info/FBOs-Paper.pdf>. Date of accessed 5 September 2019.

White, L. 1967. *The Historical Roots of Our Ecologic Crisis*. *Science*, Science 155 (3767): 1203-1207.

Winright, T 2011. *From saving the whales to protecting the planet as a “Duty incumbent to each and all”* (Green discipleship, Catholic Theological Ethics and the Environment). Anslem Academic: New York.

WWC. 2015. *Delivering a pact for water security*. World Water Council. [online] Available at: <http://www.worldwatercouncil.org/en/publications/delivering-pact-water-security> [Accessed 22 Aug. 2019].

WWF-SA 2017, *Scenarios for the Future of Water in South Africa*. Cape Town.

WWARC. 2016. *The Accra confession*. <http://wrc.ch/accra/the-accra-confession> Date of access 06 October 2016.

WWAP (World Water Assessment Programme). 2009. *Water in a Changing World. The United Nations World Water Development Report 3*: Paris: UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000181993> Date of access 09 May 2019.

WWAP (World Water Assessment Programme). 2018. *Nature-Based Solutions for Water. The United Nations World Water Development Report*: Paris: UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000261424>. Date of access 9 May 2019.

Zietsman, H.L.; Pauw, J.J; Jaarsveld, A.S; and Wessels, K.J. 2011. *Observations on Environmental Change in South Africa*. Stellenbosch: SunPress.

ANNEXURES

ANNEXURE A

12 August 2016

Informed Consent

Introduction

I am MJ Motaung, a Masters student at the Vaal Triangle Campus of the North-West University, conducting research about the awareness and participation of the priests and members/ congregations in the Emfuleni Local Municipality area, in environmental issues, with a focus on water-related issues. My student number is 10833889.

To be able to complete the research, I am required to interview priests and members/congregations in various churches in the Emfuleni Local Municipality area, and to survey their awareness, participation and knowledge through questionnaires. The study will benefit the church community in various ways, such as the level of awareness, knowledge and participation of the churches is environmental issues with specific focus on water. This can provide vital information for identifying interventions that may contribute to the church's involvement in environmental issues.

Those that participate in the study do so voluntarily. Your voluntary participation to make this study possible is highly appreciated, and it is important that you indicate that your participation is indeed, voluntary. Please indicate below:.

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Title, initials and surname of participant:

Signature of participant: _____ Date: _____

ANNEXURE: B

Questionnaire: Church members

Please complete the questionnaire by answering ALL the questions. We guarantee the confidentiality of this questionnaire. The data obtained will only be used in a summarised format for research purposes.

1. Personal information

Please mark the appropriate box:

1.1	Your age	18–20 years	21–24 years	25–29 years	30–35 years	
		36–40 years	41–50 years	51–60 years	60+ years	
1.2	Gender	Female	Male	Other		
1.3	Ethnic group	African	White	Coloured	Indian	Other
1.4	Home language	English	Sesotho	Afrikaans	isiZulu	Setswana

		Sepedi	Tshivenda	Xitsonga	isiXhosa	Other
1.5	Residential area	Town			Township	
1.6	Qualifications	Grade 1–5	Grade 6–9	Grade 10–12	Grade 12+ Certificate	
		Grade12+ diploma	Degree	Honours	Masters +	
1.7	Employment status	Employed		Unemployed	Self-employed	
		Employed part-time		Casual	Pensioner	
1.8	Monthly income	0–R750	R750–R1000	R1001–R1500	R1501–R2000	
		R2001–R2500	R2500–R3000	R3001–R5000	R5001+	

1.9	Position in church	Member	Elder/Deacon	Committee Member	

Congregants					
Question	Questionnaire item	Strongly Agree	Agree	Disagree	Strongly Disagree
1	The local church is active in issues affecting water in the society.				
2	The church believes that God has given them the mandate to look after the earth's resources.				
3	A good church is active in matters of water pollution.				
4	The participation in matters of water conservation and water pollution, is for all members of the church.				

5	Members of the local assembly take part in community forum dealing with water issues.				
6	The effectiveness of the local church is measured by its participation on water issues.				
7	The local assembly is directly affected by water-related issues.				
8	Our minister has dedicated teachings on environmental issues.				
9	The local church participates in social environmental issues.				
10	The Bible teaches us that we should care for the environment, which includes caring for water.				
11	I know individual members in the church who take part in environmental issues.				
12	I know individual members in our church who take part in matters of water pollution and water conservation.				
13	Our church teaches the community about environmental responsibility.				
14	Our church believes that it is affected by the water issues in our country.				

15	South Africa does not have water issues.				
16	What happens in our environment does not affect our church members.				
17	Emfuleni Municipality does not have water pollution problems.				
18	The church is too small a group to create a meaningful impact on the environmental problems that the communities face.				
19	The ministers/pastors are the only people who can deal with environmental issues.				
20	Our church leadership is actively involved in water and environmental issues.				

ANNEXURE: C

Questionnaire: Priests

Please complete the questionnaire by answering ALL the questions. We guarantee the confidentiality of this questionnaire. The data obtained will only be used in a summarised format for research purposes.

1. Personal information

Please mark the appropriate box:

1.1	Your age	21–24 years	25–29 years	30–35 years	36–40 years	
		41–50 years	51–55 years	56–60 years	60+ years	
1.2	Gender	Female	Male	Other		
1.3	Ethnic group	African	White	Coloured	Indian	Other
1.4	Residential area	Town		Township		

1.5	Qualifications	Grade 1–5	Grade 6–9	Grade 10–12	Grade Certificate 12+
		Grade 12+ Diploma	Degree	Honours	Masters +
	Years of Formal Theological studies	None	1–2	3–4	5 and above
1.6	Years in ministry	1–3	4–6	7–10	
		11–15	16–20	Above 20	
1.7	Church Membership	Below 100	100–199	200–300	301–500
		501–700	Above 700		

Priests

Question	Questionnaire item	Strongly Agree	Agree	Disagree	Strongly Disagree
1	The local church is active in issues affecting water in the society.				
2	The church believes that God has given them the mandate to look after the earth's resources.				
3	The church has the structure for facilitating participation in environmental matters.				
4	Emfuleni Local Municipality is not facing water pollution issues.				
5	I know individual members of the church who take part in water and environmental issues.				
6	I know people in our church who take part in matters of water pollution and water conservation.				
7	The Church believes that it is affected by the water issues in our country.				
8	South Africa does not have water issues.				

9	The ministers are the only people who must participate in challenges related to water issues.				
10	Caring for creation was part of my theological training.				
11	The church structure encourages that we teach about caring for creation.				
12	Caring for creation is an integral part of leadership seminars.				
13	The leadership at various levels in our church, participates in water and environmental issues.				
14	Environmental issues form part of our standard agenda in our church conferences.				
15	My church communicates important environmental dates and events regularly.				
16	I encourage my church members to recognise and observe the Earth Hour.				
17	The church is actively participating in the agenda for the green environment.				
18	Our church is "green" – that is, takes active steps to use renewable energy.				

19	Members in our church are encouraged to use "green" technology.				
20	South Africa is classified as a water-scarce country.				

ANNEXURE D

Permission to conduct the survey

I am, a Masters student at the Vaal Triangle Campus of the North-west University conducting research about

My student number is:

Permission is hereby sought to conduct a research in the questionnaires that will to completed by The outcome of the research will be presented to you as the

Those that participate in the study do so voluntarily. Your voluntary participation to make this study possible is highly appreciated, and it is important that you indicate so if you are participating in the study voluntarily. Please indicate below.

Yours sincerely,

The permission is granted/decline
