A Systematic Theological Exploration of Hydraulic Fracturing in South Africa

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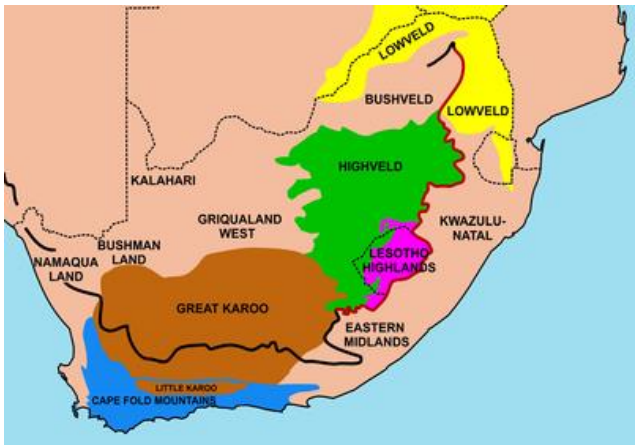
LIST OF ABBREVIATIONS

COP21	Conference of the Parties
DNA	Deoxyribonucleic acid
GNP	Gross National Product
HVHF	High Volume Hydraulic Fracturing
JPIC	Justice, Peace and the Integrity of creation
NORMs	Naturally Occurring Radioactive Materials
SDG's	Sustainable Development Goals
TKAG	Treasure Karoo Action Group
UN	United Nations
USA	United States of America
UNCTAD	United Nations Conference on Trade and Development
UNFCCC	United Nations Framework Convention on Climate Change
USDW	Underground sources of drinking water
WHO	World Health Organisation

ABSTRACT

We live in times where technology is central to every little detail of human existence. As a result of this, the world's civilisation has developed quite extensively. The subsequent escalating awareness of an environmental crisis has led to widespread societal and religious reflection on the human relationship with the earth. Such reflection has strong patterns in most religious traditions in the realms of ethics and cosmology and can be seen as a subset – and ramification of a theology of nature. Therefore, eco-theology not only tries to address our understanding of reality but makes us aware that we are part of nature, there is no 'us' and 'them' but all of us are part of nature, that is, ontological integrity.

At the present moment with the escalating energy crisis in South Africa's power utility, Eskom's struggling to meet the demand of the country, the industry is embarking on exploratory high volume hydraulic fracturing (fracking) to extract the huge reserves of natural gas contained in shale rock. Energy companies want to harness the untapped reserves of natural gas below the Karoo area as seen on the map below.



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The Karoo is a dry plateau, or elevated area of level ground, in the central part of South Africa. The name Karoo may have come from an ancient Khoekhoe word that means "harsh land of thirst."

There is a growing debate around this new venture as environmentalists, ecologists, theologians and communities have mixed reactions or feelings about this. This ranges from issues such as risks of air, soil and water pollution, methane escape, earth tremors and quakes linked between fracking technology and climate change. There are both pro and anti-campaigns around fracking.

The question is; how do we move forward? What is our theological response as a society in addressing the issue?

CHAPTER ONE

1. INTRODUCTION

1.1 THE CONTEXT

I would like to focus first on a report from the oldest members of the so called Black Nobility of Europe, “Club of Rome” – of which the first edition was written in the early 1970’s (Coleman 2008: Loc 217 of 255). This group published a report which shocked the world; it was a report about the future collapse of life on earth, written by scientists who had a great reputation using the latest IT technology at their disposal. This report was referred to as “Limits to Growth” - The name was chosen to mislead the unwary, especially with regard to issues of pollution, over population, depletion of natural resources, depletion of food nutritional resources and industrialisation. It was ascertained that in 100 years to come, the “Limit to Growth” will be reached in this planet – the most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity (Meadows, Randers, Meadows 2004: Loc 4 of 453).

Subsequently in 1992, a similar study was conducted to deal with the 20 year update of the original study (Limits to Growth) and the results were published in ‘Beyond the Limits’. In Beyond the Limits, a study of global development between 1970 and 1990 was engaged and the information was used to update the Limits to Growth and the World3 computer model. (Meadows, Randers, Meadows 2004: Loc 188 of 453). Beyond the Limits repeated the original message, in 1992 it was concluded that two

decades of history mainly supported the conclusions that were advanced 20 years earlier even though the 1992 book did not offer one major new finding.

Edward O. Wilson stated that; “Tropical rainforests are, objectively, the world’s habitats by far the greatest biological richness. They are also, the world’s most magically beautiful habitats…” (Martin 2015: Loc 9 of 486). It was reported that the rain forests were being cut at an alarming rate; there was speculation that grain production could no longer keep up with population growth; some thought that the climate was warming and there were concerns about the appearance of a stratospheric ozone hole. But for most people this did not add up to proof that humanity had exceeded the carrying capacity of the global environment and they could not avoid the reality but to heed the call to a world that could not provide for the ever growing population with limited resources to sustain it.

From 1970 – 2000 there has been positive developments. In response to an ever growing human footprint, the world has implemented new technologies, consumers have altered their buying habits, new institutions have been created, and multinational agreements have been crafted. In some part of the world, food, energy, and industrial production have grown at rates far exceeding population growth. In those regions most people have become wealthier. Population growth rates have declined in response to increased income levels. People are now more aware of environmental issues than ever before. Many governments around the world have created ministries responsible for environmental affairs (Meadows, Randers, and Meadows: 2004: Loc 215 of 453).

The main task was not to move the world backwards but the publication, ‘Beyond the Limits’ retained an optimistic tone demonstrating in numerous scenarios how much

the damage from overshoot could be reduced through wise global policy, changes in technology and institutions, political goals and personal aspirations. (Meadows, Randers, and Meadows: 2004: Loc 204 of 453). At the global summit on environment and development that was held in Rio de Janeiro in 1992, the year in which 'Beyond the Limits' was published, global society finally had decided to deal seriously with the important environmental problems even though humanity failed to achieve the goals of Rio. Ten years later (in 2002), at a conference in Johannesburg, South Africa, fewer achievements were realised which was almost paralysed by a variety of ideological and economic disputes by efforts of those pursuing their narrow national, corporate or individual self-interests. Therefore, humanity would be wise to learn the lessons now before the costs lead to irreparable harm for our species and the planet we are leading to destruction.

1.2 THE PROBLEM

In the closing decades of the twentieth century, there was a growing interest in the way in which the earth is valued by human beings. The most influential argument supporting this particular interpretation of the western Christian attitude towards nature was mounted in 1967, when the American medieval historian Lynn White accused the Judeo-Christian tradition of being largely responsible for the dichotomy between humankind and nature (Collins 1995: 87). Following this, a fascinating controversy broke out. Lynn White argues that, Christianity bears a substantial burden of guilt for the modern ecological crisis, that is, it is to be blamed for the emerging ecological crisis on account of its using the concept of the 'image of God', found in the creation account in Genesis (Genesis 1:28), as a pretext for justifying human exploitation of the world's resources. He further argues that the creation narrative legitimated the notion

of human domination over the creation, hence leading to its exploitation (McGrath 2001: 303). However, Rupert Sheldrake has argued that White's views are too simplistic; he believes that the real problem is 'much deeper'. Sheldrake traces human antagonism to nature back to the ancient Greeks and even further in terms of humankind's constant need to manipulate and sometimes destroy our environmental surroundings (Rupert 1990: 25). Sheldrake is correct in that even those cultures that lived in harmony with nature inevitably changed their environment. This concurs with Thomas Berry's argument that humankind ever since Neolithic times has been constantly motivated by 'exploitative anthropocentrism' (Collins 1995: 88). Berry points out that traditional China had an exalted view of nature but this did not prevent the Chinese from destroying much of the forest cover of China long before the Christian era (Thomas Berry in an Insight interview, Radio National (Australia), recorded 30 June 1993)

A closer reading of the Genesis text indicated that such themes as humanity as the 'steward of creation' and 'humanity as the partner of God' are indicated by the text, rather than that of 'humanity as the lord of creation.' In essence, the doctrine of creation affirms the importance of human responsibility towards the environment – to maintain and use wisely the gifts that God has bestowed on us. God wishes human beings to be his collaborators in the work of creation, redemption and sanctification (https://en.wikipedia.org/wiki/Stewardship - accessed on 22 September 2016). The Old Testament sees creation as the possession of humanity, it is something which is to be seen as entrusted to humanity, who will be responsible for its safekeeping and tending (McGrath 2001: 303).

In an important study dating from the final decade of the twentieth century, that four fundamental ecological principles can readily be discerned within the biblical narratives reflecting the Christian doctrine of creation, namely;

- The ‘earth-keeping principle’ - just as the creator keeps and sustains humanity, so humanity must keep and sustain the creator’s creation.

- The ‘Sabbath principle’ – creation must be allowed to recover from human use of its resources.

- The ‘fruitfulness principle’ – the fecundity of the creation is to be enjoyed, not destroyed.

- The ‘fulfilment principle’ – there are limits set to humanity’s role within creation, with boundaries set in place which must be respected (McGrath 2001: 304)

Clearly, humanity contributes to the escalating ecological crisis and as if this is not enough, we go further and apply new devastating methods like fracking. This exploration needs a lot of water for the drilling and fracturing let alone the soil, water and air pollutions, human health issues and environmental degradation that comes with it. One fracking well can require 27 million liters of water (in a water scarce country like South Africa). Is it materialism? Is it consumerism? Or is it exploitation of First World countries? The problem here is the general misinterpretation of Genesis 1:28, the subsequent wrong ethics and the history of disobedience by humanity from the Garden of Eden. So, hydraulic fracturing in this instance will further contribute to the current ecological crisis, since it is being used as a tool to bring about a sustainable

economy without any consideration or adherence for a sustainable environment. Issues of environmental justice are also ignored as humanity continues to advance, intentionally or not, an anthropocentric attitude towards creation. The challenge now, is to re-interpret Genesis 1:28 and to see our solidarity with nature.

1.3 HYPOTHESIS

This study aims to give a true interpretation of the role of humanity towards creation, efforts of bringing back humanity to God in relation to the creation narrative found in Genesis 1, God's instruction and interpretation as recorded in Genesis 1:28 and ultimately changing our attitude and preserve nature. Furthermore, use the commands found on Genesis 2:15 emphasise God's original intention of earth-keeping, preservation, conservation and good stewardship especially in the wake of the exploration of hydraulic fracturing in South Africa. The Christian faith would be untrue to itself if it remains silent about fracking as fracking is totally devastating to nature, to humans and to life on earth. Otherwise, there will be consequences to the disregard of creation, disrespecting and violating the mother earth. In essence, society needs to adapt to a Franciscan moderate life and refrain from indulgence, unscrupulousness and destruction of creation by:

> Living in a universe that reflects the beauty of God, sharing it with other creatures whom he regarded as his brothers and sisters. *To respond to God's generous love in a spirit of humility and poverty, in simplicity, joy, peace, gratitude and service and with a profound respect for all humans and other creatures.* (http://www.franciscans.ie/franciscan-way-of-life/)

1.4 METHODOLOGY

I will use available study literature, a multidisciplinary approach by using much scientific data and put it into a theological framework. At the beginning I will reflect on the influential 1967 essay by Lynn White Jr. on the Judaeo-Christian idea of humanity having dominion and authority over creation which indirectly led to the current ecological and environmental crisis. The emphasis will be our understanding of the relationship between humans and nature according to the first creation story of Genesis 1:1-2:4a. I will also deal with the report of the oldest members of the Black Nobility of Europe, “Club of Rome” – of which the first edition was written in 1970 and subsequently in 1992, a 20 year update on the original study (Limits to Growth) and the publishing of ‘Beyond the Limits’.

A selective number of authors on the subject and eco-theology will be assessed together with the support of empirical data.

1.5 STRUCTURE

Chapter one will highlight a report of the oldest members of the Black Nobility of Europe, “Club of Rome” – of which the first edition was written in 1972. This report was referred to as “Limits to Growth”, which highlighted the manner in which the earth would not sustain population growth in the manner it was escalating. A reference will be made of the implications from Genesis 1: 28 and the influential essay published by Lynn White Jr., who argued that, Judaism and Christianity are to be co-blamed for the modern ecological crisis, that is, it is to be liable for the emerging ecological crisis on account of its using the concept of the ‘image of God’, found in the Genesis creation

account. Reference to UN's SDG's will be highlighted as a guide to healthy sustainable living.

Chapter two will deal with fracking as a scientific method of exploration. The emphasis will be made on the definition of 'Hydraulic Fracturing'/'Fracking', how it is performed and the process thereof. Looking at countries like the US where fracking is operational and the anticipated fracking in the Karoo as well as other parts of South Africa.

Chapter three will deal with fracking and its ecological impact. I will highlight environmental degradation, i.e., soil, water and air pollutions. The negative effect of fracking on human life like congenital defects in babies and cancer. The depletion of natural and food nutritional resources as a result of industrialisation and over population, the economic impact on the poor as a consequence of rise in water tariffs.

Chapter four investigates the whole notion of the doctrine of creation: What is the nature of God's relationship with creation? How is God related to the world, and in what sense can God be called 'creator'? A characteristic biblical emphasis is that the creator has authority over the creation. Humans are regarded as part of that creation, with special functions within it. The doctrine of creation then leads to the idea of human stewardship of the creation, which is to be contrasted with a secular notion of human ownership of the world. Creation is not ours; we hold it in trust for our children and generations to come. Again, what does theology have to say to modern cosmological theories? Creator becoming the creature and the implication of the doctrine of creation. Last, elaborate on our own Christian approach to ecology.

Chapter five probes into the notion of ecological economy and nature conservation. A vision of how human beings ought to live on planet earth in light of the perceived reality of where and how we live – allocation of scarce resources in order to keep the community and the environment working in a sustainable manner. Finally, deal with issues pertaining to justice and sustainability.

Chapter six deals with a theological assessment of the impact of fracking on creation, Accra Declaration on climate change, World Council of Churches response on environmental degradation, COP 21, what role should humanity play in caring for creation and last, make reference to biblical eco-theology and our responsibility as Christians as enshrined in Genesis 2:15.

CHAPTER TWO

FRACKING AS SCIENTIFIC METHOD OF EXPLORATION

2.1 WHAT IS FRACKING?

Hydraulic Fracturing (also referred to as hydrofracking or fracking), is a process used in oil drilling, breaking up underground rock to free the oil and natural gas inside. Pockets of gases, mainly methane, are trapped deep underground in plate-like layers of rock called shale. Graves defines hydraulic fracturing as the use of extreme pressure to force a highly salinised water and sand solution into an oil or gas well to open small fissures in the deep rock (Graves 2012: 10). This exploration is commonly used by people to refer to fracturing and uses lots of water in its process (Obo 2013: Loc 274).

Shale gas is trapped within the impervious rock and it cannot be extracted simply by drilling a few boreholes into the reservoir, and allowing the gas to flow out naturally; but by using a special technique, hydraulic fracturing, to stimulate the formation in order to boost the production of gas. Applying the process of hydraulic fracturing makes the less permeable formations more permeable and commercially viable (Obo 2013: Loc 469).

These natural gases have huge potential for energy and electricity production. Oil and gas are fossil fuels, providing energy when burned and used to power vehicles, heat buildings and homes and provide electricity (Felix 2014: 4). In order to get to the gas, a well has to be dug through the rock past the level of underground water

(groundwater) into the shale. The well is then turned sideways and drilled horizontally to get to the pockets of gas. A mixture of water, sand and chemicals is pumped at high pressure through the wells, fracturing the shale and releasing the gas.

2.2 HOW IS FRACKING PERFORMED?

Before commencing a hydraulic fracturing job in a shale bed, the site must be drilled deep down until the borehole reaches the target low-permeable rock formation where the oil or gas is deposited. The fracking process is conducted in stages. The first stage is perforation or 'perfing'. Because the stell casing and cement would prevent gas from flowing into the well, small holes are punched into the production casing and cement in the horizontal portion of the well using a device known as a perforating gun. An electrical cable known as a wireline is used to lower the perforating gun into the well. The electrical signal is sent down the wireline, and the perforating gun fires an explosive charge, puncturing the casing and cement with small holes. These holes also enable fracturing fluid and proppant to enter the shale formation during a frac job (CAEPLA 2011: Loc 356).

After the well drilling, casing, and cementing process, and after a high-powered perforation gun is fed into the well bore to puncture the casing, cement, and rock at specific locations facing the production formation deep down, the next step is creating fractures on the rock bearing hydrocarbons – natural gas reservoir. Before they start with the hydraulic fracture treatment job, operators or service companies perform series of tests. Any leak is eliminated prior to initiation of the fracking treatment. After testing surface equipment, the hydraulic fracturing process begins with the pumping of a "rock-acid" – usually hydrochloric acid. This acid helps to clean the near-wellbore

area, which may have become plugged with drilling mud and cement, during drilling, casing, and cementing procedures. Typically, to a targeted formation thousands of feet below there are potential sources of drinking water, the next step, basically, is pumping fluid into the shale rock through a created controlled point of entry for the fracking fluid to fracture the impermeable rock in order to allow easy flow of natural gas from the rock into the wellbore.

This method has been used for extracting natural gas in vertical wells since the 1940s, but did not have the potential to access as many reserves until it was combined with either type of drilling (i.e. directional or horizontal). With directional drilling the well can be guided towards the gas reserves giving a much wider area to extract gas from than a vertical well allowing mining of more reserves from a single site. This was improved by horizontal drilling that allows the well to bend at 90^0. When drilling a horizontal well, operators begin turning the drill a bit when they near the production zone so the wellbore runs through the formation horizontally: then it can extend up to 3048m, which vastly increases contact with the production zone relative to vertical drilling (Holloway & Rudd 2013: Loc 498).

A mixture of about 99.5% water and proppants of about 0.5% chemical additives is pumped at a very high pressure into the well's production casing, then forced through the perforations located at the casing walls in the bottom of the well bore adjacent to the production formation. The fluid then goes into the shale formation. The applied high pressure causes the formation to fracture, thereby breaking the rock and creating tiny hairline fractures. As high pressure fluid injection continues, this fracture can continue to grow, or propagate (Obo 2013: Loc 858). Through the opened fissures,

natural gas finds its way out into the wellbore. Normally, fracturing fluid ("fracking fluid") suspension carries propping agents (proppants) which are extremely small particles granular substance that are made up of fine quartz sand grains, ceramic materials, aluminium pellets, or other materials. These proppants can withstand high pressures of up to 15,000 psi (CAEPLA 2011: Loc 366), without the individual grains being crushed.

The estimated amount of proppant used in industry has grown tenfold since 2000. In some regions, it is not uncommon to see upwards of four million pounds of proppant used per well, and for proppant to represent up to 5% of well costs (Holloway & Rudd 2013: Loc 940). The agent serves to keep the cracks open when fracturing fluid is withdrawn after a fracture treatment. When pumping is stopped, and the excess pressure is removed, the fracture attempts to close. The proppant will keep the fracture open, allowing fluids to then flow more readily through this higher permeability fracture from a high pressured formation (the shale bed) into a lower pressured zone (the wellbore).

Dr. Okon Obo continues to make a simple analogy that, (of flow from higher to lower pressure zone) is an act of opening a bottle of most drinks – particularly, soda. While trying to remove the bottle's cover, there would be a force inside the bottle (liquid and gas) tending to push the cover off. Once the cover is off, fluid and gas from the bottle gush out. The ideal explanation is that, the pressure inside the bottle is higher than the pressure outside the bottle. Once the bottle is opened, fluid, gas, or both would certainly find their way outside (as they tend to move from a higher to lower pressure zone). Proppants hold open the fissures while the fracking fluid flows out after a

fracking job. Without proppants, the holes created by the hydraulic fracturing job would close due to geostatic pressure (pressure due to overburden weight of surrounding rock) and the well would completely cease production. Through the resulting fractures, natural gas can then seep out of the shale's pores, and be effectively produced.

Along with the natural gas that seeps into the wellbore, coupled with produced water, about 15-80% of the fracking fluids is returned to the well surface. The wastewater is a mixture of flow-back fracking fluid, produced water, and some substances. When returned to the surface, it is stored in open pits or tanks. It may be transported to wastewater treatment plants, injected into underground tanks, or recycled for reuse at the well (Obo 2013: Loc 895). The process of hydraulic fracturing increases the exposed area of the producing formation, creating a high conductivity path that extends from the wellbore through a targeted hydrocarbon bearing formation for a significant distance, so that hydrocarbons and other fluids can flow more easily from the formation rock, into the fracture, and ultimately to the wellbore.

2.3 LOOKING AT FRACKING IN THE UNITED STATES

For many years, from President Richard Nixon to Barack Obama, the U.S. presidential administrations have been calling on the nation to become "energy independent". The Presidents have pointed out the advantages of having the United States capable of producing all the energy it needs, without having to depend on other nations around the world for its coal, oil and natural gas. It was recommended that this objective must be realised through conservation, increased development of U.S. natural resources or expansion of alternative energy forms such as wind and solar power – but all have agreed on the desirability of energy independence (Newton 2015: Loc 170).

Sometime after the turn of the century, the discussion of energy independence took a new turn. The evaluation of the amount of oil and gas and in particular which could be extracted from U.S. territories suddenly began to rise. Two major technologies were responsible for this change in outlook: directional (also known as horizontal) drilling and hydraulic fracturing. When the two are used in combination with each other, they proved to be successful in squeezing oil and gas out of deposits that had previously been ignored or abandoned.

The technique of horizontal drilling was actually first applied to dentistry. In 1891, John Smalley Campbell described the idea that flexible shafts could be used to rotate drilling bits for dental applications, but he did not exclude the notion that its use is not confined thereto, but that it may be applied to flexible driving-shafts of any other description. Although the first recorded horizontal oil well was drilled in 1929, until it was improved and succeeded in the 1980's (Bamberger & Oswald 2014: Loc 149). Since the 1940's, hydraulic fracturing has been used in more than one million wells in the U.S. Initially, it was developed to stimulate oil production from declining oil reservoirs. Recently, the technique is used to increase oil and gas production in unconventional reservoirs like the deep shale formation. This technique is believed to be used in about 90% of new oil and gas production wells. (Obo 2013: Loc 830). In the 1960s, The US government experimented with using underground nuclear explosions to fracture the rock and enable gas recovery from the rock.

The 1970s was the first decade in which large volumes of frack jobs were performed for the purpose of increasing recoverable reserves in tight formations, rather than increasing well productivity or overcoming wellbore damage (CAEPLA 2011: Loc 197).

It was also the decade in which coalbed methane production began, initially as a way to prevent explosions in underground coal mines. This brought the adoption of an exceedingly literal name, 'Massive Hydraulic Fracturing' as the production was exceeding their expectations from less than 15% in the early 1970s to 50% or more in the 1980s. In the 1990s, advanced technology was used for companies to drill deeper wells which allowed horizontal drilling of shale. This type of drilling held great amounts of oil and natural gas. It was in the U.S. that oil and natural gas companies discovered large shale formations in places like; Pennsylvania, New York, West Virginia, Maryland and Ohio. U.S. oil and natural gas boom began in the 2000s and 2003 was referred to as "the key year" in fracking (Felix 2014: 6).This intervention, according to economists, has changed the ordinary lives of Americans for the better. For example, North Dakota, used to be a small town, now schools are overcrowded, more money is coming into the town. Businesses are booming, almost everyone has a job, infrastructure is being improved, new houses are being built though not enough to accommodate everyone. The overall economy has improved significantly. In 2003 this town had a population of 16 000 with 40 000 jobs available – the oil and gas boom created 1, 7 million jobs between 2008 and 2012.

2.4 FRACKING IN THE KAROO – SOUTH AFRICA

A report by Julienne du Toit in the Karoo Space, **(**http://karoospace.co.za/karoo-fracking-update-august-2013) in August 2013, stated that the South African government made it clear that it is in favour of shale gas exploration and possible fracking in the Karoo. The then Minister of Trade and Industry Rob Davies said government wanted to open the way for shale gas exploration in the Karoo before elections in 2014. The government has been silent on the issue of fracking since the

moratorium on shale gas exploration was lifted in September 2012. The silence was broken by African National Congress (ANC) in July, after the party's National Executive Committee lekgotla (gathering). It said that government will no longer debate the issue of fracking, and that it would start granting exploration permits for shale gas in early 2014 (http://karoospace.co.za/karoo-fracking-update-august-2013/).

On 21 August 2013, the then Deputy President, Kgalema Motlanthe spoke at the National Assembly, saying that scientific advice to the government was that the mining of shale gas through the controversial hydraulic fracturing or fracking method would be a "game changer" for the country's economy.

It is believed among politicians that fracking can help save South Africa from the current economic downturn and that fracking was part of a range of steps to stimulate investment and job creation because of fears that a downturn in commodity prices would slow economic growth. South Africa could not rely on a tentative upturn in the United States and Europe to help local growth and jobs, said Davies. Also, there were worries that South Africa's outlook was clouded by a slowing down of large economies like those of China and India. According to the report by Paul Vecchiatto, Business Day newspaper on the 28 October 2014, fracking in the Karoo is a controversial issue with ecologists saying it could destroy the primeval environment while communities say it would bring much- needed jobs and investment to a generally impoverished area (http://www.bdlive.co.za/business/energy/2014/10/28/rules-on-fracking-in-karoo-to-be-published-in-january).

A study which was done by Rhodes University students also revealed that, the Karoo is under threat (http://www.sst.org.za/pages/53?project_id=11 accessed on 28 September 2016). One of our countries most unique and prized eco-systems, which covers 15% of South Africa's landmass, is in danger of being significantly damaged in the pursuit of natural gas. While the search for oil and natural gas in the Karoo began in the 1960s the signs they found were deemed insignificant and financially infeasible, however the development of a drilling technique has changed all this. This has prompted a renewed search for these hydrocarbon deposits deep underneath the Karoo. The proposed prospecting area covers the size of KwaZulu Natal), of which the majority has been applied for by Shell (http://www.ru.ac.za/rugreen/activism/fracking/).

A major problem is that the Karoo is a fragile and unique environment. First, the Karoo is home to just over one million people living on farms and in some 100 settlements. It supplies 30% of South Africa's red meat, 30% of its wool, and 100% of its mohair (Nel & Hill 2008: 2275). Second, it is fragile because water is scarce and most of its people are completely dependent on water from artesian aquifers [an underground layer which holds groundwater under pressure. This causes the water level in the well to rise to a point where the pressure is equal to the weight of water putting it under pressure] (https://simple.wikipedia.org/wiki/Artesian_aquifer). Third, it contains more than 6000 plant species of which 40% exist nowhere else. Fourth, the dangers of fracking in this place is greater than in other parts of the globe, where the process causes only minor problems owing to operational errors (Golder Associates 2011: King 2012). The reason is that South Africa is the only country known where shale gas deposits have been intruded by dolomite. This makes the situation in the Karoo unique

and thus the extrapolation of knowledge from elsewhere in the world to the area should be applied with caution (Vermeulen 2012:149-150).

It is naturally fruitful and productive and has been made more so by human activities such as irrigation, wind-powered water pumps and careful, creative husbandry. But because of its fragility and uniqueness, it must be protected and treated with greater care than many other areas, lest its productivity be destroyed. It must therefore be flagged as an 'earth-care fragile zone', to be handled with care.

Hydraulic Fracturing has a poor environmental and safety record globally and in early January of 2011 the potential existed for these applications to slip under the radar and gain government approval within South Africa. Not only has evidence been shown that the toxic chemicals generally used in fracking often leak into water tables, but furthermore evidence from various studies suggest that far from being a clean energy alternative fracking is almost as, if not more, greenhouse gas intensive as deriving energy from coal.

One concern about fracking in the Karoo is that the process needs a lot of water for the drilling and fracturing. One fracking well can require 7 million gallons (27 million liters) of water. Many industries use a lot of water and return the used water (wastewater) to the environment which is contaminated by chemicals. This type of water contains massive amounts of brine (salts), toxic metals, and radioactivity. And so the gas companies have a problem of how to deal with such contaminated waste (http://energyblog.nationalgeographic.com/2013/10/04/fracking-water-its-just-so-hard-to-clean/).

In 2012, fracking in the US created approximately 787 billion liters of wastewater (Felix 2014: 12). Since the Karoo is a semi-desert and often experiences drought, current water scarcity raises the question of whether fracking will cause further water shortages in the area. Shell claims that the water used in the drilling and fracking can be recovered and re-used, which is being done at sites in the USA. Another risk is that the water pumped into the wells and the waste water can contaminate groundwater. Groundwater is the main source of water for towns in the Karoo.

This can happen if there are any leaks or breakages in the wells allowing the fracking water to seep up to the groundwater. There is also a risk that methane (also known as “dry gas”) (CAEPLA 2011: Loc 260) can move up to the surface after the shale has been fractured (http://www.enviropaedia.com/topic/default.php?topic_id=273). The Karoo also has a unique type of underground structure with a lot of channels of underground water, which may present new risks that already established sites in the US haven't encountered. There has been speculation that fracking can lead to earthquakes in areas that are at risk. This will be dealt with in the next chapter when I will be dealing with the impact of hydraulic fracturing on creation.

CHAPTER THREE

FRACKING AND ITS ECOLOGICAL IMPACT

3.1 WATER CONCERNS IN THE KAROO

As mentioned previously in chapter two, the fuels produced by fracking can be harmful to the environment, but the process of fracking can also be damaging. Fracking and drilling involves many machines. They dig up the earth at drilling sites providing power to wells and haul oil and gas, many run on fuel made from oil. This adds carbon to the air speeding up climate change. Some companies have found ways to avoid this. Machines can run on fuel such as natural gas that releases less carbon, but buying new machinery can be expensive. Therefore, natural gas releases carbon when it is burned, and methane is released when/if natural gas leaks during transport or refuelling. This is a major environmental concern as fracked gas wells leak up to 40% to 60% more methane than non-fracked wells.

Fracking uses vast amounts of water – this is an immediate red flag in a water-poor country like South Africa. Sometime ago, it was reported in the *Mail & Guardian* newspaper on the 16 Apr 2012 by the Department of Environmental Affairs that, South Africa will need R570-billion for investment in the water value chain in the next 10 years. This amount is needed to pay for water resources infrastructure, water services and water conservation and demand management across national government, municipalities and the country's existing 12 water boards. The vast funding needs raise the probability that water tariffs for consumers are likely to rise in the coming years.

With that in mind, in the Karoo and the surrounding farms, life is sustained by dependence on groundwater for survival, and we now know that groundwater can easily be contaminated (Holloway & Rudd 2013: Loc 1141 of 6228). Annual rainfall varies between about 50mm in the west to 350mm in the east. By far the greatest worry is that the invasive process of drilling and fracturing and large quantities of chemicals and explosive gases will cause short-term and long-term problems with the groundwater. It is still unclear where the water will come from. Possibilities mentioned by the Shell Company so far include seawater, brackish water from deep wells in the Karoo and wastewater (http://karoospace.co.za/lowdown-on-fracking-in-the-karoo/). For exploration purposes, the companies might be able to use fresh water, but it's unlikely there will be enough fresh water for full production. It is noted that during the production phase (after exploration), every shale gas well is fracked several times, typically within five years, each time using up to 20 million liters of water. This means that there will ultimately be thousands of wells with contaminated water and what would then happen afterwards? The quantities are massive, and the water is briny, unusable and contaminated with chemicals.

However, it is not only what the fracking companies add that is dangerous. Three kilometers down, there are already harmful substances that would come up with the briny wastewater. These include Naturally Occurring Radioactive Materials (NORMs) and possibly carcinogenic substances like benzene, toluene, ethylene and xylene, which are associated with hydrocarbons.

For this reason, Shell has said they will have to dispose of the salty contaminated wastewater at hazardous waste facilities during the exploration phase, and have said

they will create other facilities if they go into the production phase. Will that happen? There are several mining dumping places from Johannesburg all the way to Carletonville that were left unattended and have since caused contaminated fresh water around these areas. Many big companies have a waste management portfolio in their operations but resolve to ignore it bringing about non-care to the environment and destruction to the eco-system.

This brings me to other factors that are of great concern and are also the after effects of hydraulic fracturing, namely, pollution, over population, depletion of natural and food nutritional resources and last, the impact of industrialisation (Club of Rome concerns).

3.2 HEALTH CONCERNS DUE TO FRACKING AND OTHER FORMS OF POLLUTIONS

It was reported in “Life” magazine, winter 2015 edition on page 30-31 that, aside from the volumes of precious water used, the process has been found to cause small earthquakes, environmental degradation (hundreds of trucks transporting water and hazardous materials), air pollution and contamination of soil and surface water due to chemical spills, gas leaks, cracked well casings, or inadequate disposal of waste and toxic flow-back water. The Cancer Association of South Africa has now partnered with TKAG’s founder, environmental advocate and Professor Eugene Cloete of Stellenbosch University to promote an analysis of the current quality of drinking water on the Karoo farms (www.sun.ac.za/english/Lists/news/DispForm.aspx?ID=4050).

Their concerns are not without base, as US studies have presented data showing lower birth weight and certain congenital defects in babies born to women living close to HVHF natural gas sites. General health complaints include skin, eye and throat

irritation, nausea or vomiting, breathing difficulties, nose bleeds, headaches and dizziness. Radiation Oncologist, Dr. Sudeshen Naidoo (*of De Muelenaere Oncology)* at “Life Fourways” Hospital in Johannesburg, explains that:

> *“there is sufficient scientific evidence to indicate that fracking fluid contains formaldehyde (in high amounts linked to nasopharyngeal carcinoma, nasal sinus carcinoma and leukaemia), benzene a known human carcinogen toxic at levels greater than five parts per billion, associated with leukaemia, multiple myeloma and non-Hodgkin’s lymphoma, crystalline silica (cause of lung cancer), diesel fuel, xylene and other possible carcinogens. In addition, fluids trapped in the shale-concentrated ancient sea water contains varying amounts of radionuclides, metals and metalloids such as strontium, barium, and arsenic. These agents cause DNA breaks, resulting in chromosomal aberrations and mutations which result in cancer “(Life 2015: 30-31).*

If it can be proven scientifically that fracking can bring about life disturbance; then, irrespective of what it can do for us economically, it is not something that can be pursued to enhance renewable energy for our country.

Apart from the pollution of underground water it is also a threat to soil and air quality. According to the World Health Organisation (WHO), air quality in the world’s 20 largest cities fails to meet their minimum health guidelines. This means that 1, 3 billion people live with dangerously unsafe levels of air pollution. As a result, four million children die every year of respiratory and related diseases (Martin-Schramm 1997: 12). Again, people, organisations and institutions opposing hydraulic fracturing point to the environmental risks, including contamination of ground water, depletion of fresh water, contamination of the air, noise pollution, the migration of gases and hydraulic chemicals to the surface, bringing pollution to the soil, surface contamination from

spills and flow-back, and the possible health effects of these (Zaghi: 2014: Loc 17 of 364). People are fearful that during hydraulic fracturing contamination of drinking water also occurs.

In its journey into and out of the formation, the fracking fluid is encased in the well's steel casing. So, according to 'FracFocus', the US hydraulic fracturing chemical registry, chemicals commonly used in shale fracturing fluid include: acid to remove drilling mud damage at near-wellbore area; biocides to control bacterial growth; corrosion inhibitors to prevent corrosion in the pipe; and friction reducers to allow fracturing fluids and sand to be pumped to the target zone at a higher rate and reduced pressure than if water alone were used.

Many critics have always maintained that the fracking fluid that is injected into the formation contains toxic substances, which will eventually find their way into drinking water by leaking into the groundwater during this procedure. (Obo 2013: Loc 1048 of 2129). Usually groundwater resources are located closer to the earth's surface and very far from the deeper location of the shale bed that may hold oil or gas. Surface casing protects underground sources of drinking water (USDW) from having any form of contact with the contents of the internal casing

Furthermore, the quality of groundwater can affect not only health, but also society and the economy. Groundwater contamination can adversely affect property values, the image of a community, economic development and the overall quality of life shared by all. Once groundwater is contaminated, it is usually very difficult and costly to clean (Holloway & Rudd 2013: Loc 1141 of 6228).

During exploration, fracking activities at the drill pad can be loud. When they occur in residential communities, efforts are frequently undertaken to abate the noise by surrounding the drill pad with noise blankets, sound curtains or even wall barrier systems. Heavy duty trucks also cause significant levels of noise and dust (Holloway & Rudd 2013: Loc 804). Therefore, noise is a concern to people who will be living near a natural gas well. Some cite 24 hour per day continuous operation during the preproduction process and at compressor stations and that it is a nuisance to humans and animals living close by. Some of the noise sources may include moving earth heavy equipment, working on a site, erecting a drilling rig, operation the rig, supplying well site with materials and tools. These noises could be annoying and irritating to surrounding neighbours, interrupt sleep cycles, and in rare occasion, may cause deafness (Obo 2013: Loc 1409 of 2129). The other negative impact is the road damage and air emissions from truck traffic. Bad roads coupled with the physical appearance of such an industry – natural gas well sites may have a negative impact on the marketability of property in the area. People will prefer not to purchase such property or live so close to these sites. Oil or Gas development sites also affect animal and wild life habitat.

In 2009, some citizens of a small property in upstate New York was surrounded by neighbours who leased their land to energy companies for gas drilling. They learned that their land could be drilled under and the gas extracted without their consent. Their concern was around the impact of this drilling on water and air. The veterinary medicine discovered what was happening to companion animals and livestock in areas near the existing industrial oil and gas operations. Healthy cattle dying within one hour after exposure to hydraulic fracturing fluid, cows failing to reproduce and

herds with high rates of still born and stunted calves after exposure to drilling wastewater; dogs failing to reproduce after drinking contaminated well water; cats, dogs, and horses developing unexplained rashes and having difficulty breathing after living in intensively drilled areas (Bamberger & Oswald 2015: Loc 127 of 264).

3.3 OVER POPULATION

With the anticipated exploration about to happen in the Karoo, an increase in population due to migrant labour will be experienced, and this, especially in most developing countries has had a disastrous effect. The water supply in the Karoo is limited as the region is semi-dessert. As the then US Vice President, Al Gore said: “Societies that learned over the course of hundreds of generations to take out a living within fragile eco-systems are suddenly confronted – in a single generation – with the necessity of feeding, clothing and sheltering two or three times as many individuals within those same eco-systems”. These countries cannot afford to care for their environments. Insatiable and unstoppable human needs put enormous pressure on delicate eco-systems, with the resultant droughts, famines, and areas of expanding deserts (Collins: 1995: 45).

Humanity has taken a long time to reach its current size given the circumstances. Most of this growth, however has taken place in more than 40 years. The British population and development expert Paul Harrison has compared the five main phases of human population growth to the five gears in an automobile. From the year of the Lord to the year 800, the growth rate was in first gear, crawling along at 0, 03%. Agricultural improvements between 800 and 1700 shifted the car into second gear, producing a growth rate of 0, 11%. The Industrial Revolution pushed us into third gear, quickening

the growth rate to 0, 57% between 1700 and 1950. From 1950 to 1980 improvements in health and increased agricultural production in less developed countries propelled humanity into forth gear and dramatically increased the growth rate to a peak of 2,05% in the 1960s (Martin-Schramm 1997: 15). It took one hundred years to grow from 1 billion people in 1830 to 2 billion people in 1930.

Even though the human population has more than doubled in size from 2, 5 billion to nearly 6 billion in the mid-1990s, the largest jump is still ahead. According to the 2015 World Data Sheet, the figures are now more than 7 billion people in the world. This is frightening given the fact that food security is a worrying factor for many countries even developed ones. The then US Vice President Al Gore once said:

> *No goal is more crucial to healing the global environment than stabilising human population. The rapid explosion in the number of people since the beginning of the scientific revolution – and especially during the latter half of this century – is the clearest single example of the dramatic change in the overall relationship between the human species and the earth's ecological system (Gore 1992: 307).*

Al Gore emphasised the speed with which this change has developed; while it has been going on in the west for a number of decades, the major impact has occurred within a single generation in many developing countries. Serious discussion of population goes back to the second half of the eighteenth century. This was written by Thomas Malthus in his *Essay on the Principle of Population* in 1798. There has been an on-going debate since then as to the accuracy of his claims. Despite this, it is only recently that ordinary people are starting to realise that the greatest threat to the

natural world comes from the increase in the human population and the demand for on-going development to support that population (Collins 1995: 39).

The famous 'Limit to Growth' report (1972) expressed the first reservations against the feasibility of sustained economic growth. It analysed the availability of energy, the use of non-renewable resources and the increasing human population. Unlimited growth is simply not possible on a finite planet. A limited planet cannot sustain continuous, expanding demands on its resources (Conradie 2011: 21). The notion of 'Limit to Growth' is of special importance within the African context as it will not be possible for a growing population to enjoy ever-higher levels of consumption. The key factor in dealing with population problems is sustainable social and economic development. Technology fixes do not really work, instead, to some extent, they add to environmental degradation (Gottlieb 1996: 648).

3.4 DEPLETION OF NATURAL AND FOOD NUTRITIONAL RESOURCES

The World Resources Institute reported previously that for many years, consumption of most natural resources has grown more quickly in the south than in the north, although most *per capita* consumption levels are still far below those in the north. The use of fossil fuel has increased throughout the world, but industrialised nations now account for less than 50 percent of the world total. *Per capita* consumption in developing countries has risen by a factor of four for more than three decades. This reality has led some analysts to reflect on the ecological consequences which a 'looming consumption boom' might have on the planet as three-fifths of the world's

population tries to improve its standard of living and one-fifth attempts to break out of a life of abject poverty (Martin-Schramm 1997: 11).

Therefore, the use of natural resources is typically based on the assumption that, nature has an instrumental value and not intrinsic value. This means that it is only valuable in so far as it can be utilised by human beings for various purposes like; farming, mining, energy or recreation. These purposes include the consumption of resources, but can also include aesthetic enjoyment, recreation and character building (Conradie 2011:20).

According to recent reports, the practice of hydraulic fracturing is causing a drought problem in the USA and a shortage of drinking water much worse. This is while people across this country are being asked at an increasing rate to weigh the benefit and consequences of fracking and decide between their wallets and their water. During climate extremes, whether drought or flooding rains, those on the land feel it most. Agriculture suffers first and most severely up until everyone feels the impact. Drought disrupts cropping programmes, reduces breeding stock, and threatens permanent erosion of the capital and resource base of farming enterprises. Declining productivity affects rural regions and the national economy (Zaghi 2014: Loc 2 & Loc 38 of 364). It is proven that fracking is known to cause damage to geologic formation particularly a disastrous impact on supplying water for small communities' drinking water systems.

3.5 INDUSTRIALISATION

Industrialisation has affected the lives of everybody living in Southern Africa shaping the society we live in today. Industrialisation describes a complicated process of

change. This process has unfolded in a variety of ways across different countries. In the late 19th Century, South Africa changed rapidly from an agricultural society, where most people lived off the land, to an industrial society. This took place largely as a result of the discovery of large diamond deposits in Kimberley in 1867 followed in 1886 by the discovery of gold on the Witwatersrand. Mineral discoveries in South Africa/Southern Africa was not the first part of the world to industrialise and came quite far behind in the Industrial Revolution (http://www.sahistory.org.za/archive/what-industrialisation).

Furthermore, many people are consciously confronted by the reality of climate change, global pollution and massive destruction of creation and other natural habitat. All of it is contributing to the first man-made mass extinction of species that the planet has suffered, caused by industrialisation and our addiction to a materialistic lifestyle. Our materialistic culture has co-opted the concept of sustainability to its own ends. Our collective objective now appears to be to sustain our materialistic energy-intensive way of life, rather than to sustain the eco-system and its diversity of inhabitants (Vaughan-Lee 2013: 245). Maybe that is the reason behind the South African government wanting to embark on hydraulic fracturing to boost energy supply and in turn; bring about employment to many and building the economy without doing a proper environmental analysis. As much as it is vital to bring about relief in generating energy and creating employment opportunities for millions of South Africans, we cannot be seen as perpetrating environmental damage to creation.

While many people are working to try to encounter this imbalance, most are approaching it with the very same mind-set that has created this predicament. For

humanity to try to reverse and correct this mind-set a present paradigm needs to be dealt with from the root cause. First and foremost, humanity needs to understand that it was created to live interdependently with other created *beings*. Indigenous theologies within the African, Native American, Latin American, Aboriginal, Philippine and Pacific contexts emphasises on a sense of the community of all living things. The harmony between humanity and nature in pre-industrial cultures is praised and celebrated in songs and legends (Conradie 2008: 66). There is almost an overwhelming emphasis on notions of interrelatedness, mutual dependence, reciprocity, ecological balance, wholeness, the integrated web of life, "original blessing" and, especially, community. In essence, the world exists as an intricate balance of parts. As human beings, we should recognise this balance and strive to maintain and stay within this cosmic balance.

In conclusion, fracking, now we know that it is harmful to human health, animals and plants, to the air that we breathe, a huge threat to drinking and ground water, damages the nutrients found in the soil and even contributes to climate change. Society cannot afford to gamble the future of human existence and the sustenance of creation by being entangled in greed and satisfying a selfish anthropocentric attitude.

CHAPTER FOUR

DEALING WITH DOCTRINE OF CREATION

4.1 GOD AS CREATOR

At the core of all serious religious endeavours is a set of basic questions about God. Who or what is God? And what is the nature of God's relationship with creation? In what sense is God transcendent and in what way is God present in the natural world or creation? Can we safely refer to God any longer as "creator"? Is God accessible to us? Can we even experience the transcendent? How, and in what way, is this achieved? What images of God as saviour are there on offer in the contemporary world?

These questions about God, the nature of the transcendent, and the relationship of it all to the environment have become even more acute in our contemporary world. One reason for this is environmental degradation. Another is the consensus that has been developing among physicist and astronomers about the origin of the universe and its early development. Both contemporary ecology and modern theories about the big bang and cosmic origins confronts us with a set of profound and ultimate questions about God, creation and the relationship of the transcendent to the evolution of the world and our part in the world process (Collins 1995: 191). How is God related to the world, and in what sense can God be called 'creator'? What does theology have to say to modern cosmological theories?

The doctrine of God as creator has its foundations firmly laid in the Old Testament (e.g. Genesis 1, 2). The continuing importance of the Old Testament for Christianity is often held to be grounded in the fact that the God of which it speaks is the same God to be revealed in the New Testament. The creator God and the redeemer God are one and the same. The theme of 'God as creator' is of major importance within the Old Testament. Attention has often focused on the creation narratives found in the first two chapters of the Book of Genesis, with which the Old Testament canon opens. (McGrath 2001: 296). However, it must be appreciated that the theme is deeply embedded in the wisdom and prophetic literature in the Old Testament. For example, in Job 38:1-42:6 sets out what is unquestionably the most comprehensive understanding of God as creator to be found in the Old Testament, stressing the role of God as creator and sustainer of the world.

It is possible to discern two distinct, though related, contexts in which the notion of 'God as creator' is encountered: first, in the context which reflects the praise of God within Israel's worship, both individual and corporate; and second, in the context which stresses that the God who created the world is also the God who liberated Israel from bondage and continues to sustain her in the present. It has often been pointed out how the Old Testament portrays creation in terms of an engagement with and victory over forces of chaos. This establishment of order is generally represented in two different ways:

- Creation is an imposition of order on a formless chaos. This model is especially associated with the image of a potter working clay into a recognisably ordered structure (e.g. Genesis 2:7; Isaiah 29:16; Jeremiah 18:1-6)

- Creation concerns conflict with a series of chaotic forces, often depicted as a dragon or another monster who must be subdued (Job 3:8; 7:12; Psalm 74:13; Zechariah 10:11) (McGrath 2001: 296).

One of the most significant affirmations that the Old Testament makes is that, nature is not divine. The Genesis creation account stresses that God created the moon, sun, and stars. The significance of this point is too easily overlooked. Each of these celestial entities was worshipped as divine in the ancient world. By asserting that God created them, the Old Testament is insisting that they are subordinate to God, and have no intrinsic divine nature (McGrath 2001: 297). This means that, God wills for something to exist that is not God: The universe is not part of God, an emanation from the divine being. “for God is good, or rather is essentially the source of goodness: nor could one that is good be niggardly of anything: whence, grudging existence to none, God has made all things out of nothing by his own Word, Jesus Christ our Lord” (Murphy 2003: 84).

4.2 GOD’S DETERMINATION TO CREATE

“If God created heaven and earth, then God determined that God will be the creator of heaven and earth. Creation is founded on God’s creative resolve, and his creative resolve touches both God himself and his creation. It is an act of will that is directed both outwards and inwards, whereby the act that is directed inwards objectively precedes the divine act that is turned outwards: before God created the world, he determined that he will be the world’s creator. This self-designation can be seen from the reflexive structure of the existential resolve of will and the personal decision: God commits himself to create a world” (Moltmann 1981: 99). If creation is viewed under

the aspect of a divine resolve of will, God's determination that he will be the creator of a world could already imply a self-limitation on God's part in favour of this particular one of his innumerable possibilities. The reformed doctrine of decrees presented creation under the aspect of the creative resolve. Karl Barth ascertained that,

> *Creation and covenant are two different things. But by creating these heavenly bodies God sees to it that man can possess this determination. God and man would not be what they are if the covenant lacked or could lack this presupposition in creation. Because God is the merciful Lord, because man is the covenant-partner who shares but also needs this divine mercy, and because God is at the same time the creator of this man, it belongs to creation that man should be given this objective direction to distinguish for his part that which God distinguishes and wills should be distinguished (Barth, Bromiley & Torrance 2004: 158)*

Another possibility is to infer the creative God from the creation of heaven and earth. Is a particular resolve on God's part to become the creator required at all? Surely his divine life is itself eternally creative? Is it in any way possible to conceive of a condition in which God is not creatively active? For his creative activity is simply and exclusively an expression of his own inner life itself. God is not creative because he has decided to be so; he is creative because he is God. He requires no decree in order to create. All created things are rooted in the creative ground of the divine life from which they have sprung (Moltmann 1985: 80).

Creator God is Almighty and gracious, his freedom has no limits, and his commitment to what he has created is without obligation. If we start from the creator himself, the self-communication of his goodness in love to his creation is not a matter of his free

will. It is the self-evident operation of his eternal nature. The essential activity of God is the eternal resolve of his will, and the eternal resolve of his will is his essential activity. In other words, God is not entirely free when he can do and leave undone what he likes; he is entirely free when he is entirely himself. Karl Barth writes;

> *theologians understands creation as a libera actio Dei, a free act of the divine will, which can only be declared to man by God himself and therefore ex revelatione, so that we can only believe it, proving and protecting it against attacks as the content of a statement of faith, but unable seriously and convincingly to maintain it on other grounds. It need only be added that the assertion of creation is a statement of faith, i.e., a statement which can never be more than a hypothesis apart from its foundation in God's self-witness, not only on the side which maintains that God is the Creator of the world, and which therefore asserts the reality of God, but also on that which asserts that God is the Creator of the world, and which therefore asserts the distinctive reality of the world. (Barth, Bromiley & Torrance 2004: 5-6).*

He loves the world in the surrender of his Son with the very same love which he is, from eternity to eternity (John 3:16; 1 John 4:16). The glory with which he glorifies himself is simply and solely the glory of his own eternal, divine life (Moltmann 1985: 83).

The "God of the basics," the God who cares about the management of the household, is its creator, liberator and sustainer. The radically transcendent and radically immanent God is the source of everything that is, the power that frees creation from what would destroy it, and the love that nourishes it in every moment. The God whose glory is every creature fully alive cannot be a solitary, distant being. The 'trinity' is a

model, a way of speaking of God. That tries to express God's profound involvement in, with, and for the world (McFague 2001: 143). It claims that the universe originates in God, owes whatever signs of hope and goodness appear in it to God, and depends on God continuously for all forms of nourishment.

The trinity here, is an attempt to express the full dimensions of the experience of God as the One in whom we live and move and have our being (Acts 17: 28); the One from who we come, to whom we return, and in whose presence we live every minute; the One who is no more alone than we are, as Martin Buber puts it, "In the beginning is relationship" (Buber 1970: 18). From the "beginning" God is relational as we are, all the beings and things God has created. As we are not solitary individuals, neither is God: in the ecological, economic worldview and in Christian faith, beings are individuals–in-community. We are because of relationships. The trinity, then, is not a conundrum or theoretical obscurantism; rather, it is the most basic affirmation we can make about God.

Therefore, how does God's activity as creator, liberator and sustainer fit with and illumine the ecological and economic worldview? These three activities' of God spell out what the God-world relationship is from our side. Most broadly, these divine activities mean that God does everything for us: we owe our existence, our happiness, and our daily nourishment to God. They are ways of speaking of our radical dependence on God for life, for love, for all the things we need to exist and flourish – they are a doxological statement, not a scientific one. Understanding God's love in creator, liberator, and sustainer terms is especially relevant to us today if we want to live within an ecological economic worldview (McFague 2001: 144). These three divine

activities are about creaturely flourishing; they are concerned with the gift of life, its maintenance, and its liberation from forces that would destroy it.

Last, Luther explains it clearly, what it means to believe in God as creator, he says: “I believe that God has created me together with all creatures…. out of pure fatherly divine goodness and mercy, without any merit or worth on our part.” Luther then continues: “…. for all this it is my duty to thank and praise Him, to serve and to obey Him.” God has given and still preserves my body and soul: eyes, ears, and all limbs and senses; reason and all mental faculties (Barth, Bromiley & Torrance 2004: 172). In addition, God daily and abundantly provides shoes and clothing, food and drink, house and home, spouse and children, fields, livestock, and all property along with all the necessities and nourishment for this body and life. God protects me against all danger and shields and preserves me from all evil. God does all this out of pure, fatherly, and divine goodness and mercy, without any merit or worthiness of mine at all (Luther 1996: 21).

4.3 CREATOR BECOMING THE CREATURE

God’s relationship to Jesus has always been expressed in the symbol of incarnation. This symbol can already be discerned at work in the New Testament, although in a language not specifically its own. Incarnation speaks in a very specific way of God’s presence and initiative, of God’s graciousness and self-communication in Jesus Christ. The specificity of the symbol has been described as an approach ‘from above’ to the mystery of the self-communication of God in Jesus Christ. While this approach proves to be problematic, the primary question in any Christology remains that of the relationship of God to the human, the unity of God and the human, the transcendence

and immanence of God. In its theological meaning the symbol of incarnation says that God belongs to the world of God's creatures; the incarnation is a characteristic of God's being with us. God's transcendence is not from another world; it is a transcendence for men and women. The incarnation as a symbol expresses something decisive about the relationship of the human to God, and this specifically in Jesus Christ (Richard 1997: 90).

The central element of Christian theology centres upon the idea of a revelatory presence of God in Christ. Jesus Christ is regarded as making God known in a particular and specific manner, distinctive to Christianity (McGrath 2001: 249). The development of Christology from Chalcedon down to our time has been dominated by the 'God-man formula': Jesus Christ is 'truly God' and 'truly man.' All the formulas that have emerged in the course of history were intended as logical explanations of this union. The crux of the whole Christological tradition is the simultaneous living unity of God and man in Jesus Christ. This has been expressed in the doctrine of the hypostatic union, which claims that God is present so radically in Jesus' own subjectivity that Jesus' own identity is God-given and yet his own (Richard 1997: 84). The hypostatic union is the affirmation that while God and man are radically different they are one in Christ.

Kenotic Christology emerged as an attempt to deal with the nature of God's immanence revealed in Jesus. All the things that sustain and improve our lives are gifts of God. God's providential work through natural processes is such a gift, an expression of the graciousness of the creator and part of the goodness of the world that the first creation account of Genesis emphasises (Murphy 2003: 84). A principle

of divine kenosis or condescension in some sense lies at the heart of any incarnational Christology: for God to elect to be graciously present among us in the person of Jesus Christ, divine humility of an unfathomable order is involved (Ivor J. Davidson (2007) Exploring Kenotic Christology: The Self-Emptying of God, *Ars Disputandi*, 7:1, 32-3).

Early kenoticists set the question of Christ's kenosis within the limits of God's immutability, whereas the real question to be asked should be: who is God in the light of the kenosis? What is needed is a re-evaluation in our understanding of God so that kenosis will appear not as a process of de-divination but rather as an attribute of God's love disclosed in the compassionate existence of Jesus. In a Kenotic Christology, God is considered as absolute letting-be, as self-giving, as self-spending. Kenosis is understood as the way God relates to the world; creation is a work of love, of self-giving. Kenotic Christology is built on that fundamental conception of God's nature as eternal agape. God's love expressed in self-giving, while manifested in creation, is supremely manifested in Jesus Christ (Richard 1997: 94).

In a Kenotic Christology God poses the humanity of Jesus as 'other', through self-emptying. God in absolute freedom has the possibility of becoming 'the other' without endangering God's own identity. 'The other' is brought about, constituted, as God's own reality by an act of kenosis, by a dispossession on the part of God, by a giving away of Godself. At one moment, the kenosis of taking flesh in Jesus of Nazareth appears to involve constitutive change for God; at another, self-emptying is what God is doing all the time in relating to creation, and the incarnation is the definitive instantiation of a general state of affairs for divinity (Ivor J. Davidson (2007) Exploring Kenotic Christology: The Self-Emptying of God, *Ars Disputandi*, 7:1, 32-3).

The incarnation is not an assumption of human nature on the part of the eternal *logos* but rather a self-emptying on the part of God. The personal humanity of Jesus is not prior but comes to be and is constituted in essence and existence when and insofar as God empties Godself. In quintessence, Jesus reveals God - “Anyone who has seen me, has seen the father” (John 14:9). These remarkable words, so characteristic of the fourth gospel, emphasise the belief in and by Jesus. To have seen Jesus is to have seen the father – in other words, Jesus is understood to function as God. Incarnation becomes, then, a characteristic of God’s being with us. The incarnation of Jesus is a specific case of what is true about God’s presence. Incarnation expresses something decisive about God’s self-communication to the total creation. Here the problem of Jesus’ difference causes no embarrassment (Richard 1997: 98).The hypostatic unity is not so much intended as a quality that makes Jesus different from the rest of us, as it is a decisive point in the history of God’s gift of self to creation.

The once-and-for-all dimension of the incarnation is to be understood eschatologically. Jesus is the eschatological, the drama of the incarnation is not yet over: “having come about historically” is a characteristic of God’s presence. God’s presence is in the form of a servant; it is not absolutely transparent. While Jesus Christ is in glory, the world is not yet “resurrected”; it is still on the cross, the kingdom of God is still to come. As historical and eschatological, God’s presence in Jesus Christ is essentially revelational. Since Jesus is the self-utterance of God, and since God expresses Godself when God empties Godself, then Jesus as the Christ is the revelation of God. The presence of God in Jesus is dialogical and therefore revelational – it is not in spite of being a human person but because of being a human person that God is revealed in Jesus Christ (Richard 1997: 98).

4.4 IMPLICATION OF THE DOCTRINE OF CREATION

Christian theology has always maintained that there are two elements in God's creative activity. First, God is seen as the creative *cause* and *source* of all that has come to be. Second, God is also seen as the one who sustains in existence all that was, is, and will be (Collins 1995:192). The doctrine of God as creator has several major implications, of which several may be noted here.

a. A distinction must be drawn between God and the creation. A major theme of Christian theology from the earliest of times has been to resist the temptation to merge the creator and creation. The theme is clearly stated in Paul's letter to the Romans, the opening chapter of which criticises the tendency to reduce God to the level of the world. According to Paul, there is a natural human tendency, as a result of sin, to serve 'created things rather than the creator' (Rom 1:25). A central task of a Christian theology of creation is to distinguish God from creation, while at the same time to affirm that it is God's creation.
b. There is a dialectic in Calvin's thought between the world as the creation of God himself, and the world as the fallen creation (McGrath 2001: 299).
c. Creation implies God's authority over the world. A characteristic biblical emphasis is that the creator has authority over creation. Humans are thus regarded as part of that creation, with special functions within it. The doctrine of creation leads to the idea of human stewardship of creation, which is to be contrasted with a secular notion of human ownership of the world. Creation is not ours; we hold it in trust for God. We are meant to be stewards of God's creation, and are responsible for the manner in which we exercise that stewardship. This insight is of major importance in relation to ecological and

environmental concerns, in that it provides a theoretical foundation for the exercise of human responsibility towards the planet.

d. The doctrine of God as creator implies the goodness of creation. Throughout the first biblical account of creation, we encounter the affirmation: “And God saw that it was good” (Gen 1:10, 18, 21, 25, and 31). (The only thing that is not good is that Adam is alone. Humanity is created as a social being, and is meant to exist in relation with others). There is no place in Christian theology for the Gnostic or dualist idea of the world as an inherently evil place.
e. Creation as recounted in the Book of Genesis implies that human beings are created in the image and likeness of God. An idea that is often expressed with reference to the Latin phrase *imago Dei.* A distinction was drawn between the two phrases “image of God” and “likeness of God”. For Tertullian, humanity retained the image of God after sinning; it could only be restored to the likeness of God through the renewing activity of the Holy Spirit.

4.5 CHRISTIAN APPROACH TO ECOLOGY

Christianity and its derivative, western European culture have both been blamed by many contemporary ecological thinkers for being the major causes of the development of exploitative and negative human attitudes towards the natural world. The ecological complaint against Christianity claims, in general, that the Christian faith is at fault for the current ecological crisis. As Nash states, in his book ‘Loving Nature’, “The ecological complaint is the charge that the Christians faith is the culprit in the crisis. Christianity is the primary or at least a significant cause of ecological degradation (Bouma-Prediger 2010: 59). Therefore, theology should be concerned with the religious justification of any ecological concern we might have. It is the task of

environmental theology to spell out, from within the context of a particular religious tradition, the ultimate reason why we should care about the cosmos. Christianity needs to be cautious that it doesn't become too anthropocentric about the intrinsic value of nature. In its endeavour, Christian theology over emphasised the need to repair the "fall" of humanity that it has almost completely ignored the original goodness of creation (Gottlieb 1996: 270).

Concern for local and global environmental welfare is not a very explicit part of the Christian tradition. Rethinking of Christianity in terms of the environmental crisis is already happening, and it is the cause for some optimism that this tradition may potentially be enlivened by an ecological transformation. The new theological reflection comes in several different strains, namely; the apologetic, the sacramental and the eschatological attempts to formulate an environmental theology.

- **Apologetic approach** - This approach emphasises the biblical notion that God has given humanity "dominion" and "stewardship" over creation, and that this is reason enough for us to take care of our natural environment. This also defends the integrity of biblical religion and traditional theology without requiring their transformation.

- **Sacramental approach** – it focuses less on normative religious texts or historical revelation than does the apologetic approach, and more on the allegedly sacral quality of the cosmos itself. This approach interprets the natural world as the primary symbolic disclosure of God.

- **Eschatological approach** – it emphasises a vision of the future of the earth in God's presence. This vision serves as an inspiration for an environmental praxis in the present. Such an environmental praxis is guided by the conviction that "the earth is the Lord's" and may be described with concepts like stewardship, gardening or earth-keeping (Conradie 2000: 4).

During the present century, we have rediscovered the central place of eschatology in Christian faith. Hope in God's promise upon which Israel's faith was built is now also seen to be the central theme in Christian faith as well, a fact that bonds Christianity very closely to its religious parent. The faith of Jesus and his followers was steeped in the expectation of the coming of the reign of God. Reality is saturated with promise, and the authentic life of faith is one of looking to the fulfilment of God's promise, based on the complete trust that God is a promise keeper (Gottlieb 1996: 278). The environment we live in, is one of the profound samples we have of the power of God. The environment embraces all of God's most beautiful, spectacular and awesome works. It is His creation, a precious and holy resource with which he entrusted all human beings the loving care and wise use of.

CHAPTER 5

ECOLOGICAL ECONOMY AND NATURE CONSERVATION

5.1 ECOLOGICAL ECONOMIC MODEL AND WORLDVIEW

The words “economy” and “ecology” are closely related. Both deal with the ‘*oikos*’ or ‘household.’ One is the *nomos* or “rule” of the household; the other is the *logos* or “story” of the household. But despite this close affinity in the meaning of their names, as academic disciplines they have drifted far apart. For many years, each developed without regard for the other. Only recently have ecologists begun to raise questions about an economy that has serious consequences for the human household (Cobb 1992: 56). Present views of economics developed at a time when the primary needs were for production and distribution of goods and services, on the one side, and adequate but not excessive work on the other. On the one hand, ecologists view the world in quite different categories. Their concern is with the interconnection of the myriads of activities that jointly constitute our environment.

Currently, there can be little doubt that consumerism has become the dominant global culture. Ghandi once said: “God has provided enough for our needs but not for our greed”, (also see Deuteronomy 8:10-14) (Conradie & Field 2000:102). This is also true even with our own country South Africa. The key to the lifestyle that many of us have adopted is clear, *consume.* Consume to be popular, consume to have as much as your neighbour, consume to forget your problems, and consume to be happy. Unfortunately our planet will not be able to handle it if everybody on earth were to follow this lifestyle. It does not help too much to ease our consciences by recycling or

by buying eco-friendly items (Conradie & Field 2000:102). We must just stop buying all the staff we don't need. This life style of consumerism has led in three ways to a highly wasteful way of living;

- We waste many scarce and non-renewable resources in our drive to consume more and more.
- The processes needed to produce these goods often have a negative environmental impact. Even if we do not cause such damage ourselves, we support manufacturers by buying their products.
- The waste produced by all the products we consume is often harmful to the environment.

On the other hand, consumption is necessary for human activity and survival. People have to consume resources in order to survive. The poorest sections of the world's human population will have to consume more if they are to lead dignified lives. Discourse on consumption therefore has to focus on the need for moderation. Too little consumption would lead to starvation and too much consumption to constipation. The question is therefore one of: "how much is enough?"

These observations require some clarification on the use of concepts such as consumption, the consumer society, the consumer class and consumerism. The term consumer society may be used to refer to certain levels of consumption, that is, the consumption of non-renewable and renewable resources as well as the production of various waste products as a result of such consumption. This is one of where the average level of consumption is relatively high, where such consumption is widely

endorsed and encouraged and where an elaborate infrastructure is required to support such levels of consumption (Conradie 2008: 46).

The term consumer class may be used to describe levels of consumption of particular households. The Worldwatch Institute identifies three distinct classes in terms of levels of consumption;

- The poorest fifth of the world's human population who live in abject poverty and who would need to raise their levels of consumption for the sake of human dignity.
- The middle class (more than 50% of the world's population) who have access to shelter and clean drinking water, who enjoy a calorie adequate but low animal fat diet, who are reliant on public transport and who live in modest homes with electricity but with few luxuries.
- The consumer class, although income does not necessarily correlate with consumption, it remains the easiest way to identify and categorise the consumer class. It accounts for up to 86% of private consumption expenditure while poorest fifth of the world's human population account for only 1%.

This reminds us that, God has provided enough for our needs, but not for our greed (Deut 8:10-14). The ever growing gap between the rich and the poor has turned humanity to an attitude of wanting to have more at the expense of other human beings and of course, the whole created order. Therefore, we cannot therefore separate economy from ecology, this two need to co-exist. If humanity wants to enjoy God's providence, it will need to embrace the whole notion of interconnectedness.

Therefore, money is not everything. This is the first counter-cultural statement that the ecological society makes. The second is that the purpose of the money is to help people have productive, creative lives. The 1990 United Nations Report on Human Development makes this point; “The real wealth of a nation is its people and the purpose of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This simple but powerful truth is too often forgotten in the pursuit of material and financial wealth” (McFague 2001: 111). In an ecological society the good life is defined not by the individual accumulation of money, but by the use of money to help people have decent, fulfilling lives - It is all about having enough and not about having “more and more”.

Money is here being redefined in terms of its use value to the well-being of the whole community, all human beings, and the planet itself. Money is not the end but a means to an end: the end is the healthy development of human beings on a sustainable planet. By development is meant whatever it takes for different forms of life and the earth’s processes to flourish in a sustainable fashion. In this instance, development does not mean ‘progress’, but fostering or nurturing. So, money is for the purpose of realising possibilities: the possibilities within a human child and within communities of people living sustainably in nature. The environmental historian Donald Worster, calls this modern worldview “materialism” and argues that it has two intertwined parts, economic and scientific (Bouma-Prediger 2001: 71). By economic materialism Worster means, “worshipping the god of Gross National Product (GNP).” According to this worldview, “improving one’s physical condition, that is, achieving more comfort, more bodily pleasure, and especially higher levels of affluence is the greatest good in life,

greater than securing the salvation of one's soul, greater than learning reverence for nature or God."

If ecology is the study of community that works, then ecological economics is the allocation of scarce resources in order to keep that community working indefinitely – its focus being on the well-being of the community. The focus again is not principally on human beings; rather, human beings are seen to benefit when the entire system is healthy. The way we benefit as human beings is not through wealth for ourselves but through sharing in the basics of a good life. So, ecological economics is concerned with community, justice and sustainability. Just as neo-classical economics contains as implied anthropology and a view of the world, as does ecological economics. Both are interpretations, each based on what is considered important empirical evidence: the first on human greed and the second on human need (McFague 2001: 99).

There are facets of society that embraces individualistic and a community model of life. Ecological economics claims we cannot survive, even to be greedy, unless we acknowledge our profound dependence on one another and on the earth. Human need is more basic than human greed – we are relational beings from the moment of our conception to our last breath. The two interpretations are almost mirror opposites of each other on the three critical issues of allocation of resources, distributive justice and sustainability. One would wonder as to the drive behind hydraulic fracturing, will the allocation of resources still be in the hands to the wealthy and thus increasing the gap between the rich and the poor, will there be a fair distribution (improvement of economic status of the poor), and last, will the project bring about the sustainability of

life? Will the project bring about enhancement, care, conservation and stewardship of the created order?

Therefore, ecological economics begins with the viability of the whole community, on the assumption that as it thrives now and in the future will its various members, including human beings, thrive as well. In other words, ecological economics begins with sustainability and distributive justice, not with the allocation of resources among competing individuals. Ernst Conradie says; “The problem is not yet one of production but of distribution” (Conradie & Field 2000:15). Before anything else, the community must be able to survive, which it can do only if all members have the use of its resources. Then, within these parameters, the allocation of resources among competing users can take place. It does not pretend to be value free; its preference is evident – the well-being and sustainability of our household, planet earth. It recognises the *oikos* base of ecology, economics and ecumenicity: economics is the management of a community that works for the benefit of all. This economy, as a human enterprise, further seeks to maximise the optimal functioning of the planet’s gifts and services for all. But we must ask ourselves a question, are we as human beings, in a right, appropriate, fitting and proper relationship with nature? (McFague 2001: 102). The postmodern picture sees us as part and parcel of the earth, not only being dependent on it and its processes, but since we are high up on the food chain, as radically dependent.

If all people disappeared from the earth tomorrow, no plant or animal would have missed us, on the contrary, everything would be better off. But we cannot live but for a few minutes without air, a few days without water, a few weeks without the plants or

other animals. We simply are not who the reigning economic model says we are. We may be greedy, but more basically, we are needy, terribly needy. The very air, water, trees, soil, forest on which we depend now depends on us to manage them economically, that is, for the long-term well-being of the whole household of planet earth. Our very success as a species has landed us in the position of having to care for the rest of nature in order to continue as a species, in order to survive ourselves (McFague 2001: 103).

5.2 NATURE CONSERVATION

Humanity has a responsibility to the "common good" in our contexts, in the societies and regions in which we live and even globally (Dreyer 2013:3). In Genesis 1:28, God commands humankind to 'be fruitful …' The fruitfulness metaphor indicates that God created the earth to give all human beings the opportunity to realise the full potential for which God created them (Brueggemann 1997:528ff). The metaphor emphasises that the interest of animals cannot be valued above those of humankind. 'There is a legitimate anthropocentrism' contained within Genesis 1:28 (Conradie 2006:80, quoting Welker 1999:70). In biblical terms, this potential is primarily realised through the abundant life that Jesus came to give humankind (John 10:10), but also through education, health care, adequate accommodation, technological development and scientific discovery, sport, economic provision, food security, productive labour, and loving and fulfilling social relationships.

When the creator blessed humankind and commanded them to be fruitful, he must have been aware, with his foreknowledge and omniscience, that it would involve destruction and exploitation of pristine habitat. Practically anything we do has always

modified or destroyed something of creation, such as the almost conclusively proven overhunting of early Holocene mega-faunas by our ancestors (Palmer 2005:67), as well as the legitimate building of cities, farming, monoculture grazing, constructing dams, creating gardens and parks etc. There will always be a trade-off between the legitimate demands of people as against the sustaining of earth's diversity, productivity and the legitimate rights of the creatures.

This produces a tension that will always be unresolved since we read in Genesis 2:15 that God has appointed men and women not only to develop his earth creatively but also to care for it. This means that after the fall they are now, in addition, to seek to limit its degradation and protect it from irreversible destruction. Genesis 2:15 reads 'the Lord God… put him [*man*] in the Garden of Eden to … take care of it.' 'Care' translates the word "shāmar". The basic concept of the root of this Hebrew verb is 'to keep by exercising great care over' (Harris, Archer & Waltke 1980: n.p), (Van Tonder, G. & Tucker, R., 2014, 'Karoo fracking and the Christian faith community', HTS Teologiese Studies/ Theological Studies 70(2), Art. #2631, 8 pages. http://dx.doi.org/10.4102/hts.v70i2.2631). Humankind was created to keep the Garden of Eden by caring for it as any caring gardener would (DeWitt 2011:84). Eden is representative of the whole created world (Alexander 2008: Loc 24945) where our first ancestors were set the task of nurturing the global eco-system over which God had given them authority (Fretheim 1994:346). Good stewardship means making decisions, whenever possible, that keep, guard, protect, maintain and sustainably develop the world in the light of humankind's legitimate progress to increasing fruitfulness. The earth-keeping metaphor forces us to ask, 'How then can we obey God's command to be fruitful whilst allowing the rest of His creation to be fruitful?' (DeWitt 2011:73).

There is a need to be continually vigilant about earth-care because there is a force both within and outside of humankind that nullifies the creator's intentions and seeks to greedily and selfishly over-exploit the earth and the food chain (as described in Ps 104) to the point of destruction. In the Old Testament, this force of chaos is called *Tiamat*, *Leviathan*, *Rahab*, *Yam* and *Mot* [death] (Brueggemann 1997:534ff). In the church tradition, based on the New Testament, this force or personality is termed 'death, sin, the world, the flesh and the devil', and is represented in the book of Revelation by the four horsemen of the Apocalypse.

Just as God's care is reflected in divine providence over all, so human care must also reflect that care-giving. The Christian environmentalist Calvin B. de Witt is one of the most articulate authors in this vein, speaking as one who has scientific acumen, but who is also deeply committed to realising his vision through appropriation of biblical arguments for the stewardship of creation. He identifies seven principles namely;

- Society must care for the creation as God cares for us. Human earth-keeping (Gen 2:15) mirrors the providence of God in keeping human beings (Num. 6:24-26). Dominion is exercised after the pattern of Christ, so that human beings joins with the creator in caring for the land (Deut. 11:11-12; 17:18-20).

- Be disciples of the *Last Adam,* not the *First Adam.* Just as in Christ all things are reconciled (Col. 1:19-20), so the human vocation is to participate in the restoration and reconciliation of all things.

- We must not press creation relentlessly, but provide for its Sabbath. Exodus 20:8-11 and 23:10-12 show that Sabbath rest applies to the land as well as animals and human beings.

- We may enjoy, but not destroy, the grace of God's good creation. The tendency for human greed to destroy the fruitfulness of the earth is documented in the biblical accounts of human behaviour (Ezek. 34:18; Deut. 20:19; 22:6).

- We must seek first the kingdom, not self-interest. The mandate for this comes from the Gospels, such as Matthew 6:33.

- We must seek contentment as our great gain. This means being content with the gifts that creation brings, rather than always grasping after more. There are limits placed on humanity's role within creation. Paul's letters here gives some encouragement, as in Hebrews 13:5 and 1 Timothy 6:6-21.

- We must not fail to act on what we know is right. The marriage between belief and action needs to be fulfilled in stewardship practices. The need for a link between belief and action is a strong biblical theme, as in Ezekiel 33:30-32.

These principles above, which are rooted in biblical practice, rule out an earlier legitimacy of White's thesis that Judaism and Christian biblical teaching is exploitative in its attitude towards the natural world (Deane-Drummond 2008: 84). There are two questions that need to be raised here; first, is a general theme of stewardship adequate as a basis for environmental ethics? Stewardship has connotations of

management and, implicit is an exploitative attitude that principles of stewardship when used in an ecological context are aiming to correct.

Second, can a theology of stewardship respond to the reality of human sinfulness – that is, is it adequate to describe human responsibilities on earth? Ernst Conradie argues correctly that, human responsibility cannot be derived simply from the dominion verses in Genesis 1 and 2. Rather human responsibility is best understood as a grateful response to the story of God's salvific grace epitomised in the life, ministry, death and resurrection of Jesus Christ, a story of grace which is cosmic in scope and which is yet to reach its narrative completion. The thrust of this story is not towards the restoration of a lost paradise, but towards an eschatological transformation and consummation (Deane-Drummond 2008: 84).

A theology of stewardship suggests a more harmonious and environmentally sensitive relationship between humanity and creation. Human beings should be regarded as the stewards, care-takers, priests, custodians or guardians of creation. The metaphor of the shepherd may be used to epitomise stewardship. The good shepherd nurtures, sustains and protects the flock but does not refrain from using sheep as a source of meat, wool and hides (Conradie 2011: 81). The task of stewardship is the Benedictine one of 'tending the garden.' This fosters an environmental ethos where emphasis is placed on using resources wisely, sound management, reliability, commitment, dedication, hard work and responsibility towards God as the owner of the land.

Accordingly, we need to remember that resources like these, are not our own, but only entrusted to us for our care. Our role is not to function as a second God, but to carry out a commission as a *primus inter pares* among those over whom we are called to

rule. Humans retain this dominion only as long as humankind cares for the land properly. Douglas John Hall in his influential study on stewardship, '*The Steward: A Biblical model come of age*', describes a steward as, "one who has been given the responsibility for the management and service of something belonging to another, and his office presupposes a particular kind of trust on the part of the owner or master" (Hall 1990: 32)

The steward is the rightful representative of the employer – even though he or she may be a servant. On the one hand, the steward is strictly accountable to the employer and can be deprived of his or her commissioned authority – this means that a steward is a manager and a servant at the same time. For Hall, stewardship implies that we are responsible for the whole earth, that we are together responsible for the whole earth, that this responsibility includes the non-human as well as the human world, that this responsibility must seek to express itself in a just and merciful political form and that this responsibility must be exercised in the light not only of the immediate situation but of the near and distant future as well (Conradie 2011: 82). The following are dimensions of the symbol of stewardship namely;

- Theological dimension – the earth and everything in it belongs to God (Ps. 24). All authority is ultimately from God.

- Christological dimension – our stewardship is exemplified by Jesus Christ – it is the prior stewardship of Christ into which we are initiated by the spirit and through faith. Stewardship springs from Christ who is the giver of new life.

- Ecclesiastical dimension – as the body of Christ, the community of disciples is being incorporated into the work of the great steward. Against the pursuit of ecclesiastical power and ambition, the steward community exist to serve the needs of the world.

- Anthropological dimension – all human beings have stewardship as their vocation. Since human beings bear the image of God, they have to follow the creator's concern for creation by acting as the stewards of God's creation.

- Eschatological dimension – the life of a steward is one of being conscious of the coming end. Stewards must be watchful (Luke 12), trustworthy (1 Cor. 4:2) and blameworthy (Titus 1:7). The impending judgement will begin with the household of God (1 Pet 4:17) (Hall 1990: 48).

Our responsibility as humanity is to care for creation because we owe our respect to it. Genesis 1:28 should not be treated as a licence from God for human beings to exploit and destroy creation. This special status of being 'created in the image of God' should help us relate to the other creatures. Our behaviour need not always be arrogant, dominant and oppressive. Christian history has proved in the past that we with the help of Scripture, especially with the concept of the 'Image of God', have been involved in the unscrupulous exploitation of nature as it was explained by Lynn White. We need to redefine what the authority is for dominion over creatures, the extent of dominion, and scale of dominion. We have made little effort to understand the word 'dominion' linked with responsible behaviour, motherly sacrifice, trusteeship and stewardship. Today our structures of relationship are relatively changed. Autocracy, monarchy, and despotism are no longer acceptable words in the context of democracy

(Victus 2014: 83). These are the terms we now need to let us enter into a new relationship for which we are all preparing.

The word ‘dominion’ usually comes from a person who feels insecure psychologically, domination brings out the ugly face of a person. Dominion is not only harmful for human beings, but also for all other creatures. Our environmental principle is how to co-exist, how to cooperate with nature without involving permanent damage and the destruction of this wonderful creation of God. Dominion does not mean just domination and indiscriminate exploitation alone, it also means stewardship over nature (Rifkin 1981: 234). The use of nature is not meant for one generation only, it means not to be greedy with what belongs to future generations. Moreover we humans are commanded to populate, not over-populate. In Genesis 2:16-17, human beings are not only given rights but also given warnings of limitations as well, particularly regarding the tree in the middle of the garden. This means that full freedom has not been granted by the Almighty to do whatever we wish to do on earth, but we are governed with permission and prohibition, freedom and responsibility, together. We are supposed to tread the earth and plan around it very carefully (Victus 2014: 51).

The majority of Christians do not want to care about nature ‘since it is (earth) held for destruction’ one day by God. There are few Christians who take the other extreme position arguing, for instance, can we kill ordinary creatures like mosquitos? Since the problem is created by humans they need to control it by any means. Our thinking needs to go beyond taking an extreme position for creation. Mosquitos may be necessary at the level of prey for lizards but not at the level of harming humanity at

large (Victus 2014: 247). Our understanding of stewardship is very much limited to the charity works people carry out towards other humans.

Society has been guilty of limiting its attention to the material needs of human members of creation and forgetting that our responsibility as stewards extends as servants to the whole garden. Who is responsible for stewardship of the garden? All claim the right to use them, but no one is responsible to preserve them. Human beings are created in the image of God who himself is creative; we too should be, and be, creative and productive not destroying but restoring the earth (Beisner 1997:140).

CHAPTER SIX

THEOLOGICAL ASSESSMENT OF THE IMPACT OF FRACKING

6.1 THEOLOGICAL ASSESSMENT OF THE IMPACT OF FRACKING ON CREATION

God created human beings in His own image and likeness, provided humanity with a whole lot of natural resources ever imagined in order that humanity can enjoy his/her full providence. In addition to that, humanity was given wisdom, knowledge and power to take care of all that God has created. We as human beings, are given the status of being co-creators with God. The bonus is; he became “incarnate”, dwelt among us as a constant reminder and promise that he will never leave nor forsake us (Heb. 13:5). Our problem as human beings is that, we interpreted our stewardship of creation as equal to abuse and exploitation. Our attitude towards nature and all created order is that, we think it was created to serve us and not created to bring glory and honour to the one who created it. Everything was created to praise God and not to be subject to exhaustion, abuse and exploitation by human beings – “let the heavens rejoice, let the earth be glad; let the sea resounded all that is in it; let the fields be jubilant and everything in them. Then all the trees of the forest will sing for joy; they will sing before the Lord when he comes (Ps. 96:11-13).”

Our responsibility as humanity is to embrace the notion of interdependence with everything that God has created, take our place as care-takers and stewards towards preservation and conservation of human life in this and future generations and all other

created beings. We should understand that creation belongs to God and it is not under human ownership. Every decision should be guided by respect for creation because it is a gift from God and we should treat it with great care. The right to life for human beings should not mean death or disturbance in the general eco-system which brings about an attitude where other created beings are perceived to be more important than others.

It should be noted that God does not give land to people; God gives people to the land to care for it and allow it to flourish. If this does not happen, the land becomes degraded, as a result, God's name is dishonoured (Conradie 2011: 71). As hydraulic fracturing exploration here in South Africa is gaining momentum, and so have the public concerns about the potential environmental and health hazards associated with it. The latest development is that, the South African government said that exploration for shale gas will begin in the first quarter of 2017, ending years of speculation over the project (http://www.fin24.com/Economy/karoo-fracking-to-begin-in-12-months-govt-20160308?isapp=true accessed on 21 June 2016). But this process of fracking is posing a potential to poison the Karoo's underground water supply, and the overall life as mentioned in the previous chapters. The question now is, in the notion that we as human beings are supposed to be stewards and care-takers of the things of God, are we now affirming the whole concept of Lynn White?

Human beings must come to know that, nature is not a dead object, it is alive. According to the scientist James Lovelock, who has proposed the theory of Gaia, the earth is a living organism and also according to Hindu philosophy, nature is intelligent and conscious. The elements of earth, air, fire and water have dignity intrinsic to them.

Soil comes first, it represents nature and sustains the entire world. Everything comes from the soil and returns to the soil (Vaughan-Lee 2013: 130). The soil is the metaphor of the entire natural system. If the soil is taken care of, all of us will be taken care of, because through the soil, we are all related and interconnected.

It is commendable of governments and business communities have developed strategies and plans to eradicate unemployment and poverty in our communities, but let it not be to the detriment of our God-given environment. The problems of ecological destruction and global poverty are certainly of a magnitude that leads many to despair. From a realistic point of view, especially with the South African government going forward with plans to explore shale gas reserves trapped underground in the Karoo, it does appear as if environmental degradation will not diminish but will worsen considerably in the coming decades (Conradie & Field 2000:117).

6.2 ACCRA DECLARATION ON CLIMATE CHANGE

The Accra Declaration of UNCTAD, which took place on 25 April 2008, stated that climate change adaptation and mitigation need to be urgently addressed in accordance with the provisions and principles of the UNFCCC and declared that adequate financing and technology will be critical to help developing countries to meet the challenge.

It was agreed and declared by the conference that,

> *climate change currently poses a significant challenge, especially to the poor, who are least equipped to adapt, and that climate change adaptation and mitigation need to be urgently addressed, in*

accordance with the provisions and principles of the United Nations Framework Convention on Climate Change, bearing in mind the principle of common but differentiated responsibilities and respective capabilities, and taking into account social and economic conditions and other relevant factors. Adequate financing and technology will be critical to help developing countries to rise to this challenge. The trade and development aspects of climate change are important for development prospects of developing countries, and should be adequately taken into account in mitigation and adaptation strategies (unctad.org/en/Docs/tdl413_en.pdf)

6.3 WORLD COUNCIL OF CHURCHES RESPONSE ON ENVIRONMENTAL DEGRADATION

The Vancouver assembly of the World Council of Churches in 1983 decided to engage member churches in a conciliar process of mutual commitment (covenant) to justice, peace and the integrity of creation (JPIC). This followed upon calls at the Nairobi assembly in 1975 towards a "Just, Participatory and Sustainable Society". JPIC became the focus of the so called "Conciliar process" in which churches all over the world committed themselves to this agenda" (Conradie 2011: 72).

The fixing of today's problem without considering the sustenance of life beyond today is paramount to disobeying the notion of the "integrity of creation" - an attempt to emphasise God's loving and nurturing concern for the earth itself. From a theological perspective, the dignity of the whole creation is derived from the confession that the earth is the Lord's (Ps 24). The Christian God is the God not only of the poor but of all creatures whose integrity is violated (Conradie & Field 2000: 75).

The integratedness, the wholeness of creation, the mutual dependence and integral functioning of all forms of life and eco-systems as a whole is of vital importance. It also suggests the internal relationship between social and environmental justice since creation is at its very roots a shared home for all forms of life. The notion of "integrity of creation" thus portrays a vision of shalom – of a just, equitable and peaceful community of creation.

One problem of the use of this term is its association and possible confusion with the notion of a "status integritatis". The term is also linked to a lyrical notion of the overflowing fullness or goodness of God's creation. At the 1988 meeting in Annecy, France, an influential and more or less satisfactory working definition of the notion of the "integrity of creation" was formulated. This refers to the value of all creatures in themselves, for one another, and for God, and their interconnectedness in a diverse whole that has unique value for God. In the wake of "the integrity of creation", many churches and nations around the world have expressed a need to formulate a new ecological covenant. This covenant expresses a joint commitment to caring for the earth and seals this covenant in the presence of God (Conradie & Field 2000:122).

In 1990 the World Council of Churches organised a "World Convocation on Justice, Peace and the Integrity of Creation" in Seoul. At this meeting ten affirmations were accepted on various aspects of the social agenda of the church. Affirmation VII addressed environmental issues. In the typical language of a covenant it includes an affirmation, a statement of resistance and a commitment. This covenant reads as follows:

> *We affirm the creation as beloved of God.*

We affirm that the world, as God's handiwork, has its own inherent integrity: that land, waters, air, forests, mountains, and all creatures, including humanity, are "good" in God's sight. The integrity of creation has a social aspect which is recognised in the self-renewing, sustainable character of natural eco-systems.

We will resist the claim that anything in creation is merely a resource for human exploitation. We will resist the extinction of species for human benefit; consumerism and harmful mass production, pollution of land, air and waters; all human activities which are now leading to probable rapid climate change; and policies and plans which contribute to the disintegration of creation.

Therefore we commit ourselves to be members of both the living community of creation in which we are but one species, and members of the covenant community of Christ; to be full co-workers with God, with moral responsibility to respect the rights of future generations; and to conserve and work for the integrity of creation both because of its inherent value to God and in order that justice may be achieved and sustained (Niles 1992: 174).

6.4 COP 21 AGREEMENT

The COP21 conference in Paris in December 2015 agreed to cut greenhouse gas emissions fast enough to keep global average temperature rise under 1.5 degrees Celsius compared to pre-industrial levels. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. Many leaders in the environmental and philanthropic communities say the best way to do this is to transition modern society to 100% renewable energy as quickly as possible. The language of the agreement was negotiated by representatives of 195 countries at the 21st Conference of the Parties of the UNFCCC in Paris and

adopted by consensus on 12 December 2015. It was opened for signature on 22 April 2016 (Earth Day) in a ceremony in New York City. As of October 2016, 191 UNFCCC members have signed the treaty, 75 of which have ratified it. After the European Union ratified the agreement in October 2016, there were enough countries that had ratified the agreement that produce enough of the world's greenhouse gases for the agreement to enter into force. The agreement will take effect on 4 November 2016 (https://en.wikipedia.org/wiki/Paris_Agreement)

6.5 ROLE OF HUMANITY IN CREATION – WHAT SHOULD BE DONE BY ROLE PLAYERS

Society needs to do away with the arrogance that puts humanity at the centre of everything, the failure to see the earth as the object of God's loving care and participation in a culture where human power, dominance and greed denudes the earth (Conradie & Field 2000:121). The relationship of humans to the whole of creation is a crucial aspect for any theology that wishes to respond to environmental issues. It is this relationship that has become radically distorted. In essence, the notion of "Exploitative Anthropocentrism" must be discarded as the whole of nature was not created to serve humankind but was created exclusively to bring glory to the only one true God.

There are several reasons why this notion has to be discarded, first, perspective affects attitudes and perceptions. Second, the rejection of anthropocentrism changes the answers to some quite important practical questions. Third, the Bible, and Christianity at its best, are not anthropocentric. Fourth, humanity just is not in truth in the centre of all things (Cobb 1992: 88). On the other hand the Bible calls with great

consistency for Theo centrism. Even its focus on human beings is derivative from its way of understanding God. It is because God made us in God's image, because God cares for us, because God sent Jesus to suffer for us that we are to appreciate our own worth and care for one another.

When we shift from this theocentric vision to an anthropocentric one that takes human value and importance as its starting point, we have abandoned the biblical perspective. The theocentric perspective, however, can easily be misunderstood. It does not mean that humans have worth only because God declares us to have value. We really do have value. In the creation story it is not said that God declared creatures to be good. On the contrary, God saw that they were good. Jesus makes the same point when he says that we are of more value than many sparrows (Mt 10:31). We are of value. That is why God treats us as having value (Cobb 1992: 93). The core of anthropocentric self-righteousness is the presumption that we are somehow above this world when in fact we are totally dependent upon it for our very existence, yet our anthropocentric myths continue to shield us from these truths about ourselves (Collins 1995: 182).

Unfortunately, areas such as science, technology, economics and philosophy in the past few centuries have developed in such a way that human beings are elevated to the ruling position and given a higher status. We have developed a worldview which dictates that the human species is superior to all other species. Animals, forests, rivers and oceans must serve and fulfil not only the needs of humankind but also its greed and desires. This arrogant worldview has led to the demise of reciprocal, mutual, respectful, reverential and spiritual relationships between humans and the rest of nature (Vaughan-Lee 2013: 130). The Anglican Bishop of Salisbury, John Austin

Baker, sums up the attitude of the Hebrew Scriptures to nature in six points. First, he writes that the earth belongs primarily and uniquely to God (Ps 24). Second, under God, humankind has a position of some control over nature "which is meant to be exercised in a spirit of respect and responsibility". Third, the world is "desuper-naturalised"; that is, it is neither divine nor demonic.

As a result, humans can deal with it rationally, factually, and as it really is. Fourth, the greater part of the world is created for its own sake and humankind will never fully understand God's intentions in creation. Fifth, the world and nature reflect something of God's wisdom; therefore, as human beings we must respect the natural order and be ready to learn from it. Finally, nature, like humankind, will not come to completion until the end time: "Nature is not perfect; there is a work of salvation to be done in it, as well as in humanity" (Collins 1995: 94). This fits perfectly with the most positive text in the New Testament about the role of the natural world: Romans 8:22-23

> *We know that the whole creation has been groaning in labour pains until now; and not only the creation, but we ourselves, who have the first of the Spirit, groan inwardly while we wait for adoption, the redemption of our bodies.*

In this extraordinary text St. Paul links our human fate to that of the whole creation and says that all of reality is struggling through a birth-process towards a spiritual redemption that is bodily and material.

As we recognise human rights, deep ecology requires us to recognise the rights of nature. Our relationship with nature must be embedded in an increasing awareness of the principles of nonviolence and reverence for life. From a theocentric point of view,

the issue of the relation of human beings to other creatures and all of nature is whether God is served when we minister to the non-human as well (Cobb 1992: 93). Nature is divine, sacred and holy as well as abundant. All the species are fed and nourished through the sacrificial act of life sustaining life. Humans are blessed with the gift of nature as long as they take from nature what they need to meet their vital requirements, for survival and for living (Vaughan-Lee 2013: 132).

Human beings, as part of creation and having been given the responsibility of filling the earth and subduing it (Gen 1:28), have a huge role to play in saving the earth and all other creatures from environmental destruction. In the language of the Christian tradition, this calls for repentance, conversion and renewal of the heart (Conradie & Field 2000:121).

All we need to do as a society, is to change quickly and profoundly or to use the appropriate religious terminology, to experience “conversion” if we are going to develop a more nurturing and caring attitude towards the natural world. What is called for is the ecological equivalent of deep spiritual change, and this is always a very difficult and painful process (Collins 1995: 172). The additional problem that we face is that this will have to happen soon or else there will be too little of the earth left to save.

Just as we must undergo a conversion and a change of life if we are to be persons of genuine spiritual conviction and religious faith, so to become ecologically aware we must pass through a real conversion process to come to an existential consciousness of our human relationship to the world. It is only when we pass through this process that we realise that spirituality and ecology are not mutually exclusive but actually

belong together. For someone to get to this point of ecological commitment requires a profound change of attitude to the natural world. A real cosmological “conversion” has to occur. This conversion is far wider than the church. It involves people from all walks of life. Society has to humbly take their stance alongside others, many of whom have long led the way in ecological conviction and practice. As human beings, we need to play a particular role by coming to a new understanding of the ecological meaning and consequences of our deepest faith convictions (Edwards 2006)

Pope John Paul II said that in Psalm 148:1-5

> *The vision of earth could be the representation of a lost paradise as well as that of the promised paradise. The image of earth is a ‘heavenly universe’ at the origins. Thus is seen the harmony between man and the fellow creatures of earth and how they lived in peace with man as the dominant creature in charge of finishing off the creators job of making a perfect world. According to Genesis, this plan was continually interrupted by humans' sin and there was a constant tension between God, the men of the earth and even nature. Humanity has disappointed the divine expectation. Man has polluted, destructed, deformed and upset earth's habitat and natural cycles. This is why we must ‘stimulate and sustain the ecological conversion’. We need to make humanity more sensitive and conservative when it comes to the environment (http://ecologicalconversion.weebly.com/the-meaning-of-pope-john-paul-s-speech.html accessed 6 October 2016).*

This will involve a deep interior change and the consequent making of a personal commitment (Collins 1995: 174). The results of this will be a strong sense of biological and existential identification with other living things and ultimately with the land and the earth itself.

This process of bringing to consciousness our sense of oneness with the earth manifests itself through the release of a deep feeling of sympathy and unity with the specific place in which we are – and more generally with the land, the animals, the trees, the plants and the natural world. As profoundly and personally connected with oneself. Therefore, ecological conversion involves the sacrifice of the extreme elements of our modern sense of individuality as we begin to recognise our commonality with and interdependence upon all other species. In other words, conversion should occur within the epistemological frameworks that help us make sense of our lives and through which we give expression to our most important experiences. This conversion (whether secular or spiritual) can be, but need not necessarily be, a sudden event; some people can actually trace it to a specific moment. It can also happen over a period as our attitudes change gradually but profoundly and a real interior shift occurs at an unconscious level which only slowly rises to consciousness. (Collins 1995:181).

6.6 BIBLICAL ECO-THEOLOGY AND OUR RESPONSIBILITY AS SOCIETY WITH REFERENCE TO GENESIS 2:15

Llewellyn Vaughan-Lee maintains that; “When you look at what is happening to our world – and it is hard to look at what is happening to our water, our air, our trees, our fellow species and the earth – it becomes clear that unless we have some roots in a spiritual practice that holds life sacred and encourages joyful communion with all fellow beings, facing the enormous challenges ahead will become impossible” (Vaughan-Lee 2013: 147). Therefore, the command in Genesis 1:28 to “have dominion” over the earth plays a pivotal role in a Christian understanding of the relationship between humanity and nature. The history of the interpretation of the dominium *terrae* motif in

Genesis 1:28 has been extraordinarily complex, leaving in its wake a highly destructive legacy. Since this text has often been used and abused in the history of Christianity, virtually every major contribution to ecological theology discerns the need to offer a reinterpretation of this text. Most ecological reinterpretation of Genesis 1:28 attempt to move away from an understanding of dominion as domination. Instead, the meaning of dominion is interpreted in terms of the metaphor of stewardship. Such ecological reinterpretations of Genesis 1 suggest that human need to act as just and caring stewards of the land entrusted to them by God (Conradie 2011: 85).

The Genesis 1:28 command is not interpreted in terms of domination or military conquest, but in terms of caring, protecting, nurturing, gardening, cultivating or serving. We can learn to rule the earth only if we rule over our own ruling. We as human beings, are responsible for “tending the garden” which God has entrusted to us for our care. Brueggemann understands ‘dominion’ in terms of the care of the shepherd who protects his flock and leads it to green pastures (Conradie 2006: 78). So, to rule the earth is the function of the shepherd king (Ezekiel 34) or the ideal king (Psalm 72).

God created man and woman in his image and likeness (Genesis 1:26-28) and marked this act as a special moment. Instead of creating man and woman ‘according to their kind’, He created them in his image and likeness. Though the image/likeness is not defined, v. 28 gives an exegetical clue by tying this image/likeness to the task of dominion. It is not that having dominion is what constitutes the image of God, but rather that exercising dominion is what being made in God’s image enables us to do. Man is to be God’s vice-regent, lovingly ruling God’s good creation under the oversight of its king.

In Genesis, God tells Adam to be fruitful and multiply (1:28) to work the garden (2:15), and not to eat the fruit from the tree of the knowledge of good and evil (2:17). These commands imply that God gifted humans to image him in a holistic manner (*being spiritual, moral, rational, creative, relational and physical capabilities*) in order to fulfil a unique role in his good world. When God's image bearers function under his rule and fulfil their proper role, God's peace reigns over his creation (Easley & Morgan 2013: 241). Human beings are placed in the garden with greater responsibility to "till and keep" the earth. Dominion does not mean just domination and indiscriminate exploitation alone. Use of nature is not meant for one generation only, it means not to be greedy with what belongs to future generations. As humans, we are commanded to populate not over-populate.

Genesis 2:16-17 says, that, human beings are not only given the rights but also given some warnings of limitations too, particularly regarding the tree in the middle of the garden. Full freedom, has not been granted by the Almighty for us to do whatever we wish to do on the earth, but we are governed with permission and prohibition, freedom and responsibility, together (Victus 2014: 51). As humans, we are supposed to tread the earth and plan around it very carefully.

As human beings, we should be stewards, guardians, gardeners, or care-takers of creation. We should read and use the message of Genesis 1:27-28 in the light of Genesis 2:15 which calls us to cultivate and foster the land. Human beings are responsible to "tend the garden" that God has entrusted to us for our care. This means proper stewardship that requires a wise use of resources, sound management and responsibility towards God as owner of the land.

It is essential that we continue to care for the God-given land because; first, it is a sacred gift from God. The earth and everything in it is the Lord's and must be treated with respect, humility and in awe. The earth itself is where God's presence can still be discerned in the rest of the Sabbath, in the celebration of communion, temples, churches and the sumptuousness of his nature (Conradie & Field 2000:63). Second, the whole cosmos is the object of God's continuous, creative, loving and nurturing care. This love of God for the earth is exemplified in the life, ministry and suffering of Jesus Christ who came so that the whole cosmos (not only human beings) may share in the abundance of eternal life. In Jesus Christ, the whole creation is reconciled with God (2 Cor 5:19). As care-takers of God's earth, we are called to treat others, including nature with the same loving, nurturing care and respect.

Last, our Christian hope is that the Holy Spirit will renew the whole of creation, that God will establish a new heaven and a new earth that our own bodies, together with the rest of creation will finally be taken up in God's presence. As a Christian community, we can make an extremely helpful contribution by setting an example of an ecologically conscious community. This community can embody itself the vision of a sustainable earth community where justice and peace will prevail. Calvin Beisner, says; "God did not tell the man to protect the wilderness against the encroaching garden. He told the man to protect the garden against the encroaching wilderness. God also told Adam to protect the garden; He did not tell Adam to protect all the rest of the earth. Indeed we may infer from this…. That an implicit part of the cultural mandate was the gradual transformation of the rest of the earth into garden" (Beisner 1997: 127).

This scientific-technological exploration called hydraulic fracturing, is not going to get us out of this present ecological crisis until as a society, we find a new religion or rethink our old one. Re-interpretation or contextualisation of Genesis 1:28 coupled with Franciscan way of life would be ideal.

First, the word “subdue”. In Hebrew this is *kabash*. You can’t get around it; it does mean “subdue” or “enslave”, and even in the harshest instances “molest” or “rape.” But here’s the catch: it only means this when the party being subdued is already hostile. Hence it’s used to speak of military enemies in scripture. Not to subdue an attacking army would lead to death. Hence, we subdue the earth because without such subjugation the harshness of nature would yield death for us rather than life. Therefore “subdue” in Gen 1:28 implies that creation will not do man’s will gladly or easily and that man must now bring creation into submission by main strength. It is not to rule man. However, there is a twistedness in humanity which causes us to perform such a task with fierce and destructive delight. Try as we might, we cannot subdue this. But it can be subdued and this is the promise of Mic 7:1[9], “He will subdue [*kabash*] our iniquities.” *(*Harris, R. Laird, et al., Theological Wordbook of the Old Testament. electronic ed. Chicago: 1999, c1980, S. 430).

As God subdues that in us which leads to death rather than life – sin – so too we subdue in nature that which leads to death, turning it around so that it yields life. Jesus’ words about pruning in John 15 provide a beautiful example of the way in which God subdues sin, using as an analogy the way a farmer subdues nature. Thus agriculture and other life-giving uses of nature are proper fulfillment of the command to “subdue” creation. Second, the word “dominion” or “rule”. In Hebrew this is *radah*. It’s a royal word. This is the dominating rule of a king. What kind of king does

God desires? The same word is used in Psalm 72, originally a coronation psalm for Solomon. Verse 8: "*May he have dominion* [*radah*] from sea to sea…." But now look at verses 12-14 to see what that dominion, that *radah*, looks like: *"He delivers the needy when they call, the poor and those who have no helper. He has pity on the weak and the needy, and saves the lives of the needy. From oppression and violence he redeems their life; and precious is their blood in his sight"*

What is the kind of rule that God doesn't want? Ezekiel 34:4 gives us an example. In a tirade against Israel's kings, God says through the prophet, "*You have not strengthened the weak, you have not healed the sick, you have not bound up the injured, you have not brought back the strayed, you have not sought the lost, but with force and harshness you have ruled them*." The kind of dominion that God desires is one that protects the defenseless and gives justice to the oppressed. Applying this to the command for humanity to exercise dominion over creation, we are aware that while we rule over creation, we are expected to care and protect it. As a king accepts compliment or taxes from his subjects, so too as human beings receive a generous sustenance from the fruits of creation. As much as the king should take care of the weak and poor in his kingdom, so too we are expected to guard natural beauty, preserve endangered species of God's creatures, and even to restore the places which we have too often ruled "with force and harshness." (https://christopherbrown.wordpress.com/2009/01/03/genesis-128-to-subdue-and-have-dominion-over-creation/ accessed on 28 November 2016).

Third, the prime miracle of St. Francis is the fact that he did not end at the stake, as many of his left-wing followers did. The key to an understanding of Francis is his belief in the virtue of humility – not merely for the individual but for man as a species. Francis tried to depose man from his monarchy over creation and set up a democracy of all God's creatures. He proposed an alternative Christian view of nature and man's relation to it: he tried to substitute the idea of the equality of all creatures, including human beings, for the idea of man's limitless rule of creation (Gottlieb 1996: 192).

We are required by all means, do all we have been urged by environmentalists, who are concerned about our earth – to act responsibly in whatever we are empowered to change in our immediate and extended neighbourhood. Support whatever efforts we can to keep the environment fresh and clean (Pratney 1993:169). As Edith Schaeffer rightly observed;

- A Christian who has been made in the image of God and is therefore meant to be creative on a finite level should certainly have more understanding of his responsibility to treat God's creation with sensitivity and should develop his talents to do something to beautify his little spot on the world's surface. Neighbours, friends and strangers walking by ought to find the Christian's gardens, farms, states, schools, hospitals, huts, missions and factories surrounded by the beauty of grass, moss, rocks, ferns, bushes, trees, flowers and vegetables planted and cared for with an expression of originality and artistic planning on some scale. Society should not move into a property and turn it into a shambles. The opposite should be true. It should grow and blossom

into a place of beauty, demonstrating something of the wonder of the One who made plant life to produce seed in the first place.

- We should have more beautiful gardens, be careful to build without cutting down lovely trees, be more sensitive about keeping the brook unspoiled as it bubbles through their lands. Sadly, this has often not been so….Certainly we who have a logical base for beauty as well as morals should be the ones to be fitting our land-scape gardening into artistically beautiful and ecologically sound treatment of land and plants (Schaeffer 1971: 88-89). The wonderful variety of the natural world is, therefore, part of the divine plan and, as such, invites our respect. Accordingly, it is appropriate that we treat other creatures and the natural world not just as a means to human fulfilment but also as God's creatures, possessing an independent value worthy of our respect and care (Gottlieb 1996: 645). Fracking must be stopped at all costs by civil society, environmentalist and everybody who loves creation must come together and advocate for the abolishment of shale gas exploration in the Karoo areas and anywhere else.

BIBLIOGRAPHY

Alexander, T., 2008, 'Genesis', in D. Lane, W. Grudem, J. Packer & C. Collins (eds.), *ESV Study Bible, Kindle version*, loc. 17738−21400, (Study notes loc. 24657−28345), Crossway, Wheaton.

Bamberger, M. & Oswald, R., 2014, *The Real Cost of Fracking*, Beacon Press, Boston.

Barth, K., Bromiley, G. W., & Torrance, T. F., 2004, *Church Dogmatics: The doctrine of creation*, T&T Clark, London.

Beisner, E.C., 1997, *Where Garden Meets Wilderness: Evangelical Entry into the Environmental Debate*, Eerdmans Publishing Co, Michigan.

Bouma-Prediger, S., 2001, *For the beauty of the Earth*, Baker Academic, Michigan.

Bouma-Prediger, S., 2010, *For the Beauty of the Earth – A Christian Vision for Creation care, second edition*, Baker Academic, Michigan.

Brueggemann, W., 1997, *Theology of the Old Testament*, Fortress Press, Minneapolis.

Buber, M., 1970, *I and Thou*, Scribner's, New York.

CAEPLA, 2011, *Revolution Underground: The History, Economics & Environmental Impacts of Hydraulic Fracturing*, Publishers Note, Canada

Cobb Jr, J.B., 1992, *Sustainability – Economics, Ecology and Justice*, University Press, Georgia.

Coleman, J., 2008, *The Club of Rome*, World in Review, Carson City.

Collins, P., 1995, *God' Earth – Religion as if matter really mattered*, Gill & Macmillan, Dublin.

Conradie, E. & Field, D., 2000, *A Rainbow over the land – A South African guide on the church and environmental justice*, Salty Print, Cape Town.

Conradie, E., 2006, *Christianity and ecological theology*, Sun Press, Stellenbosch.

Conradie, E., 2008, *The Church and Climate Change*, Cluster Publications, Pietermaritzburg.

Conradie, E., 2011, *Christianity and Earthkeeping*, Sun Press, Stellenbosch.

Conradie, E.M., 2000, *Hope for the earth: Vistas for a New Century*, Wipf & Stock, Oregon.

Davidson, I.J., 2007, *Exploring Kenotic Christology: The Self-Emptying of God*, Taylor & Francis, Oxford.

De Witt, C., 2011, *Earthwise, a guide to hopeful creation care*, Faith Alive Christian Resources, Grand Rapids.

Deane-Drummond, C., 2008, *Eco-Theology*, Anselm Academic, London.

Dreyer, J.S., 2010, *'Practical Theology in South Africa: Recent developments and new challenges'*, keynote paper delivered at the conference of the Society for Practical Theology in South Africa, Perspectives and paradigms, Pretoria, 21 January.

Du Toit, J., 2013, *'Karoo – the beginner's guide', in Karoo Space*, viewed 10 September 2013 from http://karoospace.co.za/karoo-the-beginners-guide/ (quoting Cape Wools and National Wool Growers Association, Mohair South Africa and the Karoo Development Foundation).

Easley K.H. & Morgan C.W. (eds), 2013, *The Community of Jesus: A theology of the church*, B&H Academic, Nashville.

Edwards, D., 2006, *Ecology at the heart of Faith*, Orbis books, New York.

Felix, R., 2014, *12 Things to know About Fracking*, Peterson, Mankato.

Fretheim, T., 1994, *'The Book of Genesis', in L. Keck (ed.), The New Interpreter's Bible*, 1, pp. 321−674, Abingdon Press, Nashville.

Golder Associates, 2011, *Proposed South Western Karoo Basin Gas Exploration Project by Shell Exploration Company B.V*, Background Information Document and Invitation to Comment Central Precinct, viewed 28 July 2013, from http://www-static.shell.com/.../upstream/central-karoo-bid.pdf.

Gore, A., 1992, *Earth in the Balance*, Taylor & Francis, New York.

Gottlieb, R.S., 1996, *This Sacred Earth*, Routledge, New York.

Graves, J.H., 2012, *Fracking: America's Alternative Energy Revolution*, Safe Habor International Publishing, Ventura.

Hall, D.J., 1990, *The Steward: A biblical model come of age*, Grand Rapids: WB Eerdmans, Minneapolis.

Harris, R., Archer, L. & Waltke, K., 1980, *Theological wordbook of the Old Testament: The word edition*, Moody Publishers, Chicago.

Holloway, M.D. & Rudd, O., 2013, *The Operations and Environmental Consequences of Hydraulic Fracturing*, Scrivener, Massachusetts.

Life magazine, *Winter 2015 edition*, page 30-31.

Luther, M., 1996, *A Contemporary Translation of Luther's Small Catechism*, Augsburg Fortress, Minneapolis.

Martin, C., 2015, *On the Edge: The state and fate of the world's Tropical Rainforests*, Greystone Books, Vancouver.

Martin-Schramm, J.B., 1997, *Population Perils and the Churches' Response*, WCC Publications. Geneva.

McFague, S., 2001, *Life Abundant – Rethinking Theology and Economy for a Planet in Peril*, Fortress Press, Minneapolis.

McGrath, A.E., 2001, *Christian Theology: An Introduction*, Blackwell Publishing, Malden.

Meadows, D., Randers, J., Meadows, D., 2004, *Limits to Growth*, Chelsea Green Publishing, White River.

Moltmann, J., 1981, *The Trinity and the Kingdom of God*, English Trans, London.

Moltmann, J., 1985, *God in Creation: An ecological doctrine of creation*, SCM Press, London.

Murphy, G.L., 2003, *The Cosmos in the light of the Cross*, Trinity Press International, New York.

Nel, E., & Hill, T., 2008, *'Marginalisation and demographic change in the semi-arid Karoo, South Africa'*, *Journal of Arid Environments* 72(12), 2264–2274, viewed 24 October 2014, from http://www.sciencedirect.com/science/article/pii/S0140196308002176

Newton, D.E., 2015, *Fracking: Contemporary World Issues – A Reference Handbook*, ABC-CLIO, California.

Niles, D.P. (ed.), 1992, *Between the Flood and the Rainbow*, World Council of Churches, Geneva.

Obo, O., 2013, *Hydraulic Fracturing (Fracking) – Procedures, Issues and Benefits*, Petroleum Zones, Houston.

Palmer, D., 2005, *Seven million years, the story of human evolution*, Weidenfeld & Nicolson, London.

Pratney, W., 1993, *Healing the Land*, Chosen Books, Grand Rapids.

Richard, L., 1997, *Christ: The Self-Emptying of God*, Paulist Press, New York.

Rifkin, J., 1981, *Entropy: New World Order*, Bantam Books, Toronto.

Rupert, S., 1990, *The Rebirth of Nature: The Greening of Science and God*, Century, London.

Schaeffer, E., 1971, *Hidden Art*, Norfolk Press, London.

Van Tonder, G., & Tucker, R., 2014, *'Karoo fracking and the Christian faith community'*, HTS Teologiese Studies/ Theological Studies 70(2), Art. #2631, 8 pages. http://dx.doi. org/10.4102/hts.v70i2.2631.

Vaughan-Lee, L., 2013, *Spiritual Ecology: The cry of the Earth*, Golden Sufi Center, California.

Vermeulen, P., 2012, *A South African perspective on shale gas hydraulic fracturing*, in C.D. McCullough, M.A. Lund & L. Wyse (eds), International Mine Water Association Annual Conference, Institute for Groundwater Studies, University of the Free State, Bloemfontein South Africa, 2012, pp. 149−146, viewed 28 March 2014, from www.imwa.info/docs/imwa_2012/IMWA2012_Vermeulen_149.

Victus, S., 2014, *Eco-Theology and the Scriptures*, Christian World Imprints, New Delhi.

Zaghi, N., 2014, *Fracking: Fracking impacts water supply systems*, North Hollywood.

WEB LINKS

https://christopherbrown.wordpress.com/2009/01/03/genesis-128-to-subdue-and-have-dominion-over-creation/

http://energyblog.nationalgeographic.com/2013/10/04/fracking-water-its-just-so-hard-to-clean/

http://www.franciscans.ie/franciscan-way-of-life/

http://karoospace.co.za/karoo-fracking-update-august-2013/

http://karoospace.co.za/lowdown-on-fracking-in-the-karoo/

http://www.bdlive.co.za/business/energy/2014/10/28/rules-on-fracking-in-karoo-to-be-published-in-january

http://www.enviropaedia.com/topic/default.php?topic_id=273

http://www.fin24.com/Economy/karoo-fracking-to-begin-in-12-months-govt-20160308?isapp=true

http://www.ru.ac.za/rugreen/activism/fracking/

http://www.sahistory.org.za/archive/what-industrialisation

http://www.sst.org.za/pages/53?project_id=11

https://en.wikipedia.org/wiki/Paris_Agreement

https://simple.wikipedia.org/wiki/Artesian_aquifer

www.sun.ac.za/english/Lists/news/DispForm.aspx?ID=4050