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Early South African Newspaper Reporting of Climate Change

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Submitted in fulfillment of the requirements for the degree,

Master of Science (by dissertation) in Geography and Environmental Studies,

in the School of Geography, Archaeology and Environmental Studies,

in the Faculty of Science,

the University of the Witwatersrand, Johannesburg

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Declaration:

I, Jarred Dean McCarthy (453411), declare that this dissertation is my own, unaided work which is to be submitted for the degree Master of Science at the University of the Witwatersrand, Johannesburg. This work has not been submitted before for any degree or examination in any other university.

_____ _____

SIGNATURE DATED

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“We suffer more often in imagination than in reality”

— Seneca

“Let’s embrace the point of no return”

— Lorde

Abbreviations and Acronyms:

CO_2 - Carbon Dioxide

ENSO - El Niño Southern Oscillation

EPA - Environmental Protection Agency

GHG/GHGs - Greenhouse gas(es)

IPCC - Intergovernmental Panel on Climate Change

KZN - KwaZulu-Natal, formerly known as Natal

LP - Labour Party

MEI - Extended Multivariate ENSO Index

MIT - Massachusetts Institute of Technology

NGO/NGOs - Nongovernmental Organisation(s)

NOAA - US National Oceanic Atmospheric Administration

NP - National Party

PACT - A coalition Government between the National Party and the Labour Party

TUP - The Unionist Party

UK - United Kingdom

UNEP - United Nations Environmental Programme

UNFCCC - United Nations Framework Convention on Climate Change

UP - United Party

US/USA - The United States of America

SABC - South African Broadcasting Corporation

SAHO - South African History Online

SAP - South African Party

SAWS - South African Weather Service (also historically referred to as the Union Meteorological Department, also interchangeably referred to as the South African Meteorological Department/Office)

SCEP - Report of the Study of Critical Environmental Problems (MIT's, Man's Impact on the Global Environment report)

SP - Supplementary Reader

SST - Supersonic Transport (American attempt to develop a commercial airliner that could fly faster than the speed of sound)

WMO - World Meteorological Organisation

*All numbers are rounded to 1 decimal

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Abstract:

Mass media is a medium used for scientific knowledge dissemination, informing society, and therefore shaping society's perspectives. A highly popularised aspect of scientific discourse in the media is climate change, given its potential threat to livelihoods, the environment, and related political and economic agendas. For the aforementioned reasons, qualitative research was undertaken to examine the diachronic portrayal, and subsequent development, of early climate change by several English South African newspapers, including *The Rand Daily Mail* and *The Star*. The undertaking of this research is made possible given an existing newspaper clippings archive at the South African Weather Service, 1906-present. The period under examination, 1906-1956 (50 years), represents significant shifts in environmental, and political agendas. Articles that contained early climate change as their point of interest were further analysed using discourse analysis and thematic content analysis by means of a coding process as well as utilising a narrative analysis. By researching diachronically, it became possible to document and describe the development of early climate change, and the development of the South African media's technique(s), and process(es) of how early climate change was portrayed. Findings suggest that without Professor Schwarz professing that South Africa was undergoing 'climatic changes', a progressive decrease in rainfall, early climate change would not have been covered as extensively as it was throughout the 1906-1955 time period analysed. This debate divided ordinary citizens and experts who agreed with Professor Schwarz and the South African scientific community, who did not agree that a progressive decrease in rainfall was occurring. Results also suggest that journalists played a central and critical role in the development of early climate change and in the development of a scientific consensus thereon. Journalists pushed for clarity on the underlying causes that resulted in 'climatic changes', which subsequently expanded the debate to include both anthropogenic and natural facets of early climate change such as solar variability, ENSO and land-use change among others.

Keywords:

Climate change, Mass media, The Republic of South Africa, Discourse Analysis, Narrative Analysis and Thematic Content Analysis

Chapter 1: Introduction

Over the course of the last century, scientific discourse has become widely and increasingly popularised by the media, and society at large (Beckers *et al*., 2007; Weingart, 2007; Boykoff, 2011). One such highly popularised aspect of scientific discourse by the media is that of climate change, due to the serious risks it poses to livelihoods and the environment (Carvalho and Burgess, 2005; Jutro, 2007; IPCC, 2013, 2014a, and 2014b). Climate change essentially is a natural process, however, due to anthropogenic practices, such as the burning of fossil fuels which in turn release greenhouse gases (GHGs) into the Earth's atmosphere, the rate of climate change is increasing at an unprecedented rate (see IPCC, 2013 for an expanded discussion on early climate change). Most notable out of the GHGs is carbon dioxide (CO_2) owing to its ability to increase latent heat retention, and in it being the product of all combustion and therefore key to the world's energy and economy (Jutro, 2007; IPCC, 2013). By using the aforementioned example of carbon dioxide, early climate change has become embroiled in controversy as it extends far beyond only an environmental agenda, but rather has in recent times become a political and economic agenda (Jutro, 2007; Weingart, 2007; Boykoff, 2011). Climate change has been popularised by the media, in part, due to the economic, political, environmental, and subsequent societal repercussions in either an attempt in limiting carbon dioxide emissions or in allowing a continuation of an increase in carbon dioxide emissions in the name of economic growth (Weingart *et al*., 2000; Jutro, 2007; Weingart, 2007; Boykoff, 2011).

In climate change discourse, comprised of historical (pre-17th century), early (17th-mid 20th century) and contemporary (mid 20th century-present), the term 'climate change' has emanated from an array of evolutionary and even inaccurate terminology, which were made popular by either the scientific, political or media spheres of society (Boykoff and Boykoff, 2007; Boykoff, 2011). The more popularised and commonly used terminology today includes: 'global warming', especially in the United States, and 'the greenhouse effect', all used to cover the vast discourse on climate change (Boykoff and Boykoff, 2007; Anderegg and Goldsmith, 2014). Understandably, some popularised terms, such as 'global warming', for example, are scientifically distinct as global warming refers to an increase in mean global temperature over a period of time (Boykoff and Boykoff, 2007). Thus, climate change is a term that is multivocal, and that encompasses different aspects of society:

politics, economics, science, technology and engineering, the media, socio-cultural and environmental discourses to name but only a few. However, the term ‘climate change’ is also personal, intimate and its definition is a production of an individual’s perception of the risk it poses which is driven by various social factors similar to the aforementioned aspects of ‘climate change’ (Morley, 1986; Burgess *et al*., 1991; Carvalho and Burgess, 2005; Weingart, 2007; Goodman, 2014). For ease of expression, the use of the term ‘climate change’ in this dissertation refers to the larger discourse of climate change itself, including its underlying processes, such as a decrease in rainfall and an increase in sea level rise and both of its facets, anthropogenic and natural (IPCC, 2013).

It has been identified by Cartwright (2008) and the Intergovernmental Panel on Climate Change, IPCC (IPCC 2013, 2014a, and 2014b), that a proportion of South Africa’s vulnerability from climate change impacts emanates from: (i) the inundation of the coastal city of Cape Town by the end of the century, (ii) changes in rainfall patterns which in turn will affect the agricultural sector (food security), and (iii) a loss of biota, impacting the ecotourism sector (the Fynbos region). The IPCC (2013, 2014a, and 2014b) further identifies that South Africa’s high levels of unemployment, poverty and inequality, among other social factors, may be additionally impacted by climate change if robust adaptation and mitigation measures are not taken. Furthermore, South Africa has a mining and manufacturing intense economy, ushered in by apartheid policies which, in part, has lead to mining and manufacturing to still comprise a large proportion of South Africa’s democratic economy today (see Wolpe, 1972, for more on capitalism and cheap labour in the mining sector during the apartheid regime, and Freund, 2009, on the Minerals-energy Complex). Among other reasons, South Africa predominantly relies on coal-fired power stations in part due to the availability of large coal deposits, the establishment of a formidable mining sector and, arguably, the lower cost of energy production when comparing coal-fired power stations to other forms of energy production (Eskom, 2014). Coal-fired power stations comprise over 85% of total energy production in South Africa, resulting in high levels of carbon dioxide emissions (IPCC, 2013, 2014a, and 2014b; Eskom, 2014).

Hence, the limitation of GHGs, mainly carbon dioxide emissions, by means of mitigation and adaptation can have severe economic implications for South Africa’s economy. For the reasons discussed, South Africa is at a crossroads between

adopting mitigation and adaptation measures to ensure minimal risk and lessen its vulnerability to climate change impacts while still developing its economy. In addition to the economic aspect, other factors such as politics, policy relevance, and society at large are also drawn into the debate as to what options South Africa has at this critical juncture, which all ultimately stimulates media attention (Beckers *et al*., 2007; Jutro, 2007; Weingart, 2007; Tagbo, 2010; Goodman, 2014).

Personal intellectual interest in the topics of South Africa's mitigation and adaptation measures towards climate change, and the South African media's portrayal of climate change originated out of curiosity. This curiosity ultimately lead to the discovery of the South African Weather Service's (SAWS) archive which is comprised of newspaper clippings from many leading South African newspapers, detailing weather and climate related news since 1906. The reporting of climate change, particularly for early climate change (17th-mid 20th century), in a South African context is nonexistent. While academic literature in the field of the media's portrayal of climate change is remarkably broad and has steadily been increasing in the last 20 years. Research on this theme has been published in the United States, the United Kingdom, Canada, India, Nigeria, South Africa, Australia, New Zealand, Russia, and Turkey among others (Carvalho and Burgess, 2005; Schmidt *et al*., 2013; Schäfer and Schlichting, 2014). Schäfer and Schlichting (2014) undertook a meta-analysis of 133 studies on the role of the media in climate change communication and found the field to be strongly skewed toward developed nations, and the medium of print media. Schäfer and Schlichting's (2014) findings are echoed in a South African context as limited research has been conducted on the media's portrayal of climate change, some examples reviewed include Tagbo (2010), Schmidt *et al* (2013), and Goodman (2014). However, in the South African literature reviewed, each research sets itself apart by conducting research, on average, on two newspapers over a period of two years, with the exception of Schmidt *et al* (2013), who analysed two South African newspapers between 2003 and 2010. The obvious and trite reasons for limited research is, in part, due to time constraints, funding, and lack of available data (Tagbo, 2010; Schmidt *et al*., 2013; Goodman, 2014).

What sets this research apart from other recent international and national research outputs is the temporal scale of the SAWS archive, 1906-present, and therein the ability to make a selection of a period for this research. The period selection for this

dissertation, 1906-1955 (50 years), represents a substantially longer, and earlier time-frame than many previous studies of this nature and in particular for South Africa (Schäfer and Schlichting, 2014). The reason for the early 20th century time-period selection was so as to provide insight into the early diachronic development of early climate change under pre-democratic conditions and during the early development of the South African media. First, in terms of the early diachronic development of early climate change, unlike the majority of similar studies conducted, this research has identified various international and local early climate change influencing variables that have garnered coverage by the South African media. This differs extensively from what is seen as the prime international source pool and influencer for the second half of the 20th century and early 21st century — the United Nations and its various arms which includes the IPCC and the, United Nations Framework Convention on Climate Change (UNFCCC) among others (Painter, 2013; Schäfer and Schlichting, 2014). Second, in terms of the coverage of early climate change by the South African media, the media itself concurrently covered the political shifts which were taking place between 1906-1955, see section 2.3: Important Political Events in South African History for a condensed review of South Africa's political history. These shifts are argued to have changed and/or influenced the process(es) of news production, a change in the amount of coverage and type of coverage of early climate change, partially fulfilling political agendas.

1.1 Aim and Research Questions

The aim of this research is to provide a deeper understanding of the diachronic development of English South African newspaper (1906-1955) portrayal of early climate change. In order to adequately provide a holistic deeper understanding of the diachronic development of English South African newspapers (1906-1955) portrayal of early climate change, this research aimed to answer two fundamental research questions:

1. What aspects of early climate change was portrayed by South African newspapers? (What was being said — subject, and why and how the subject changed overtime).
2. How was early climate change portrayed by South African newspapers? (How it was said — structure, and why and how the structure changed overtime).

In sum, this Chapter provides a brief overview of the context in which this dissertation finds itself; discussing climate change, the media's reporting thereon, the need for this research and the aim and research questions. In the succeeding Chapter, Chapter 2: Literature Review, the context in which this research is conducted is expanded on, topics such as the development of climate change as a discourse, the development of the press, South Africa's weather, climate variability and climate change and the important political South African events are covered.

Chapter 2: Literature Review

Climate change discourse is argued to be comprised of three phases: (i) historical climate change (pre-17th century), (ii) early climate change (17th-mid 20th century) and (iii) contemporary climate change (mid 20th century-present), with all three branches being based on scientific consensus held at those particular time periods. These phases were created and based on the arguments made, primarily, by Weingart (2007), Oreskes and Conway (2010) and Boykoff (2011) — to be discussed in fuller detail throughout this Chapter. The following reviews in this chapter will begin with a review on the global concurrent chronological development of both climate change discourse, historical-contemporary, and the media, and in turn the media's reporting of climate change discourse. Thereafter, a discussion on weather, climate variability and climate change provides context to contemporary climate change and in particular its impacts on South Africa. Seven dominant processes of climate change will be reviewed in more detail (Section 2.2). Section 2.3 provides localised context on the history and development of the South African press, in particular the development of the English and Afrikaans press, including regional developments, the subsequent suppression of the black press and a brief review of the history of the newspapers under further analysis. Lastly, a brief review of important political events in South Africa's history is presented in Section 2.4.

2.1 Climate Change and the Media

Science, as a social institution, has changed since its modern inception in the 17th century (Weingart, 2007). Weingart (2007) identifies three key developments in science patronage: (1) aristocracy (17th-18th centuries), (2) educated bourgeoisie (19th and early 20th centuries), and (3) mass democratic electorate (second half of 20th century-present). During the 17th-18th centuries science was supported by the courts — interest for curiosity and public experimentation with communication feeding in from 'below', a bottom-to-top model. In the 19th and early 20th centuries the educated bourgeois sought interest in science as it was seen as the provider of truth and the definition of problems and their solutions, further supported through philanthropy and popularised through journals and scientific associations, effectually transforming scientific communication into a top-to-bottom model (Weingart, 2007). Lastly, the second half of the twentieth century to present brought about mass democratic changes with the mass democratic electorate supporting science by means of popular vote (see Weingart, 2007 for a broader discussion on the history of

scientific discourse). In addition to scientific support by popular vote, the demand for inclusion and participation required new types of communication, resulting in the use of mass media, public events and institutional centers, such as universities and scientific organisations (Jutro, 2007; Weingart, 2007). From academic institutions to public, governmental or private investors and organisations, scientists today still rely on scientific institutions and their supporters for funding and to add credibility to their research, and when published and popularised by the media the research at hand can gather international recognition and future funding (Jutro, 2007; Weingart, 2007).

2.1.1 Reporting of Early Climate Change (17th to Mid 20th Century)

Historical climate change can be traced back to the third century BC Greece, the term ‘climate’ originates from the Greek term *klima*, “meaning slope or inclination — was originally thought to depend only on the height of the Sun above the horizon, a function of latitude” (Fleming, 1998, 11). Aristotle’s student Theophrastus, for example, made connections between historical concepts of deforestation, water management and the warming and cooling of the climate (see Glacken, 1967; Fleming, 1998 and Hulme, 2009 for more on the development of the historical perspectives of weather and climate). The development of not only science but the media was limited in the centuries to come due to competing factors, such as political implications, war, changing of regimes and state control over information, low literacy rates, racial and gender inequalities and technological capacity challenges (Briggs and Burke, 2005; Weingart, 2007). It was not until the invention of the Gutenberg printing press in 1450 that the proliferation of communication opportunities arose to disseminate historical climate change research, for example, amongst not only the closed elite scientific community but slowly to the outside world, the public (Briggs and Burke, 2005). It must be stated that the reporting of historical climate change was exceptionally low (Fleming, 1998; Boykoff, 2011).

It is argued by Fleming (1998) and Weingart (2007) that it was not until the first two key developments in science patronage, aristocracy (17th and 18th centuries) and thereafter educated bourgeoisie (19th and early 20th centuries) occurred that significant scientific understandings of climate change developed, leading to the development of early climate change (17th to mid 20th century). According to Fleming (1998, 5), the shift from historical (pre-17th century) to early climate change is closely interlinked to the development of four particular research approaches, they

are: (i) the establishment of the “first principles [of] what climate ought to be and how it ought to change”, (ii) the study of historical literature, (iii) analysis of extensive meteorological data, and (iv) the invention and development of meteorological and climatological technology, especially for late nineteenth century. To elaborate on the first approach, the first principles of climate were based on speculative and theoretical practices drawn from various branches of science such as physical and geological evidence and principles (Fleming 1998). For example, French physicist Jean-Baptiste Fourier, British scientist John Tyndall and Swedish physicist Svante Arrhenius, among others, contributed to the understanding of terrestrial temperature changes, infrared radiation and greenhouse gases (GHGs), 17th to 18th centuries (Fleming, 1998; Bolin, 2007; Boykoff, 2011). The second approach, (ii) the study of historical literature, made use of explorer journals or the elderly’s perception of climate change for example, to support a particular theory of cultural development or decline, popular in the eighteenth century (Fleming, 1998). For example, colonial conservationists wrote about the dangers of deforestation and mass colonial expansion, in particular colonialists in the tropics argued that deforestation had resulted in a decrease in rainfall (Hulme and Barrow, 1997). The third approach, was the collection of extensive meteorological data over large areas and extended time periods in order to deduce any trends, popular in the nineteenth century and subsequently lead to the establishment of climatology (Fleming, 1998). Moreover, moving into the nineteenth century the scientific consensus on climate change for that time was driven, according to Hulme and Barrow (1997), by the discovery of evidence of glaciation and the development of evolutionary ideas which offered a more dynamic view of nature and climate than previous views. Lastly, to elaborate on the fourth approach, meteorological and climatological technology continuously evolved and increased in accuracy which subsequently enabled improved statistical analysis of climate change (Fleming, 1998).

As these scientific understandings of early climate change developed so did the media and slowly its reporting of early climate change (Briggs and Burke, 2005; Boykoff, 2011). By the turn of the nineteenth century newfound technological and economic capacity in Europe and North America lead to the proliferation and development of newspapers and throughout the century newspapers greatly increased their influence and reach (Briggs and Burke, 2005; Boykoff, 2011). Furthermore, state owned presses were being challenged by privately owned

presses, governments and later political parties, would pass restricting laws in order to secure and promote their own political agenda (Briggs and Burke, 2005). In term of what aspects of climate change were covered during the early climate change period, western newspapers from the eighteenth to the mid 20th centuries focused primarily on links between weather, food and climate (Boykoff, 2011). For example, *The Edinburgh Advertiser* ran a story in September 1784 on the cold winters in the Northern Hemisphere which negatively impacted crop yields and in 1894 the *Atlanta Journal Constitution "*boasted of a 'warm equable climate' for agricultural production in [the] southern US region" (Boykoff, 2011, 42). In sum, connections made between weather and climate is the first point of inference when writing about climate change discourse (Boykoff, 2011).

2.1.2 Reporting of Contemporary Climate Change (Mid 20th Century to Present)

Mass media growth continued into the twentieth century and expanded into new forms, such as radio and television, newspaper circulation for North America, for example, grew from one newspaper per three households in 1870 to more than one newspaper per household in 1910 (Starr, 2004; Briggs and Burke, 2005). The mass expansion of the media in the beginning of the twentieth century was triggered by corporate concentration, conglomeration and commercialisation (Graber, 2000 and Doyle, 2002 in Boykoff, 2011). Concurrently, the mass democratic electorate supporting of science by means of popular vote resulted in state sponsored scientific enquiries with climatology being one area which was developed (Jutro, 2007; Weingart, 2007; Oreskes and Conway, 2010; Boykoff, 2011). State sponsored scientific enquires, especially for meteorology and climatology, are argued to have been predominantly amplified by various state militaries, due to their bloated budgets as a result of impending threats of war and thereafter subsequent wars (Oreskes and Conway, 2010; Boykoff, 2011). Boykoff (2011) argues that the funding of climate science by the US military acted as a catalyst in which many scientific inquiries that significantly improved the understanding of climate change, resulting in the emergence of contemporary climate change in the mid twentieth century (1950s-present). For example, in the 1950s Gilbert Plass was funded by the US military to study the infrared absorption of heat-seeking missiles. Plass' findings advertently lead to a greater understanding of atmospheric carbon dioxide and infrared radiation absorption and marked the beginnings of the shift from early to contemporary climate change (mid 20th century-present) (Boykoff, 2011). Boykoff (2011, 45) further

identifies a second important event in the development of contemporary climate change: “Also in the 1950s, funding from the US Navy and the US Atomic Energy Commission supported Han Seuss and Roger Revelle’s research on radiocarbon dating and isotope decay, to both examine fallout from nuclear bomb tests and trace the distinct isotopic signature of anthropogenic carbon emissions into the atmosphere”. Another influential US state sponsored scientific enquiry included the discovery of acid rain in North America in the 1960s, following the establishment of the Hubbard Brook Experimental Forest in central New Hampshire by the US Department of Agriculture, which Oreskes and Conway (2010, 66) further argue “came at a crucial time, coinciding with a shift in American thinking about environmentalism”. This shift is argued by Oreskes and Conway (2010) to have resulted in the passing of the Wilderness Act of 1964, and the establishment of the Environmental Protection Agency (EPA) under President Richard Nixon, which in turn signed into law several signature pieces of environmental legislation such as the Clean Air, Clean Water, Endangered Species and National Environmental Policy Acts. A profound shit in focus from land preservation, such as the Wilderness Act of 1964, to pollution prevention by means of the Clean Air and Clean Water Acts is argued by Oreskes and Conway (2010) as further representing state sponsored scientific enquiry which in turn became state regulation based on scientific consensus. Furthermore, the discovery and development of acid rain further provided the bases from which climatology and environmental science would develop, later to include studies of ozone and climate change, essentially scientific enquiries based on predicting environmental damage before it was detected (Oreskes and Conway, 2010). A second influential US state sponsored scientific enquiry which radically aided in the development of contemporary climate change was the scientific discovery that human activities could be damaging the Earth’s protective ozone layer which first entered the public mind in the 1970s and according to Oreskes and Conway (2010, 107);

> “began with the American attempt to develop a commercial airliner that could fly faster than the speed of sound. The ‘supersonic transport,’ or SST, would fly inside the stratospheric ozone layer, and scientists worried that its emissions might do damage. While the SST did not turn out to be a serious threat, concern over it led to the realisation that chemicals called chlorofluorocarbons were. In 1969, MIT [Massachusetts Institute of

> Technology] commissioned a major study of human environmental impact. 'Man's Impact on the Global Environment: Report of the Study of Critical Environmental Problems' (mercifully abbreviated to SCEP) was released a year later, and contained the first major statement on the state of the stratosphere and the probable impact of the SST. Water vapour is the second largest combustion product of jet engines, after carbon dioxide, and like carbon dioxide, it's a greenhouse gas, so the scientists worried that water vapour from engine exhaust could cause climate change".

Concurrently, while media coverage of contemporary climate change remained 'scant', according to Boykoff (2011, 46-47), there were two significant articles published which discussed contemporary climate change before contemporary climate change, the scientific consensus that is, was established:

> "[The] spheres of climate science and mass media further came together in the 1930s. In 1932, the *New York Times* staff wrote, 'The Earth must be inevitably changing its aspect and its climate. How the change is slowly taking place and what the result will be has been considered…' Media coverage of early anthropogenic climate science began as early as the 1950s. For instance, journalist Waldemar Kaempffert wrote in a 1956 *New York Times* article: 'Today more carbon dioxide is being generated by man's technological processes than by volcanoes, geysers and hot springs. Every century man is increasing the carbon dioxide content of the atmosphere by 30 per cent — that is, at the rate of 1.1°C in a century. It may be a chance coincidence that the average temperature of the world since 1900 has risen by about this rate. But the possibility that man had a hand in the rise cannot be ignored'" (Boykoff, 2011, 46-47).

Moreover, before the 1980s, media portrayals of climate change were sporadic compared to the amount of coverage seen in the later 20th and early 21st century (Figure 2.1) (Boykoff, 2011). It was 1988, in particular, that Boykoff (2011) argues as a turning point — climate science and governance flowed into public view, and climate change, the term 'global warming' in particular, increased substantially in the developed West. Boykoff (2011) argues that the increase of media coverage was as a result of several factors, chief among them ecological/meteorological events in the

form of the 1988 North American heat wave and drought, second were political issues for instance the then Prime Minister Margaret Thatcher addressing the Royal Society by giving her 'green speech' on the dangers of climate change and lastly scientific stories such as the creation of the IPCC in Geneva, Switzerland, by the United Nations Environmental Programme (UNEP), the World Meteorological Organisation (WMO) and subsequent international conferences that followed. Boykoff (2011), advertently identifies three prime drivers of contemporary climate change reporting: (i) ecological/meteorological events such as droughts or hurricanes, (ii) important political figures such as heads of state, and (iii) scientific gatherings, international meteorological and climatological gatherings by international organisations such as the previously mentioned IPCC (see Painter, 2013 for a detailed discussion on the media's coverage of reports published by the IPCC).

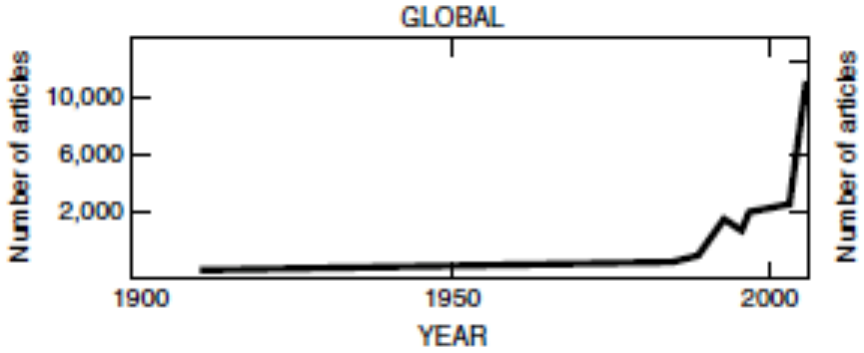


Figure 2.1: Global Media Coverage of Climate Change (After Boykoff, 2011)

2.1.3 The Framing of Climate Change

In light of the increase of media coverage from 1980s onwards, new dimensions emerged within the framing of contemporary climate change by the media, fueled by an increase in climate science (Moser and Dilling, 2007; Boykoff, 2011). The media's portrayal of environmental issues, falling under broader science discourse, such as climate change posits various challenges for media professionals (Wilkins and Patterson, 1990; Hansen, 1993; Bell, 1994; Anderson, 1997 and Smith, 2000 in Carvalho and Burgess, 2005). These challenges for media professionals stem from the understanding of the media's constructions of risk — risks posed by climate change and a lack of requisite scientific background or knowledge (Carvalho and Burgess, 2005; Boykoff and Boykoff, 2007; Painter, 2013). Aside from the use of the language of risk by the media, including by scientists and politicians, in their framing of contemporary climate change, another frame predominantly used is that of

uncertainty (Carvalho and Burgess, 2005; Boykoff and Boykoff, 2007; Painter, 2013). The uncertainty frame is used by the media, including by scientists and politicians, where scientific consensus on particular topics such as ENSO-climate change interlinkages, for example, are not know/fully understood (Carvalho and Burgess, 2005; Boykoff and Boykoff, 2007; Painter, 2013). Moser and Dilling (2007) describe challenges emerging from climate change reporting by the media as a systemic issue embedded in climate change science due to continuous chronological shifts in scientific consensus held on the causes and solutions of climate change. Hence, scientists and other authority figures take sides on whether the science or scientific consensus itself was and is to a degree still is a true reflection of reality and whether the results thereon warrant intervention (Moser and Dilling, 2007). Furthermore, Moser and Dilling (2007) argue that while legitimate debate was and is useful, they however mask the true nature of the debate at the level of intervention pertaining but not limited to adaptation, mitigation, precautionary actions, and ultimately the financial burden among other contested issues. Looking at this historically, Boykoff (2011, 33) identifies that “scepticism regarding scientific claims of environmental decline was evident during British colonialism”, where the scientific community, in the late half of the nineteenth century, warned of environmental destruction resulting from colonisation. Overall the period of the last quarter of the twentieth century and continuing today, contemporary climate change has been framed in various ways for a variety of factors, shifting from the previously predominant reported themes such as weather and food security, and a shift in the view that climate change as a scientific term is in need of refinement, and scientific confidence (Moser and Dilling, 2007; Boykoff, 2011; Painter, 2013).

2.2 Weather, Climate Variability and Climate Change

This subsection focuses on a concise definition of contemporary climate change, its implications and possible future impacts, with particular focus on Africa’s vulnerability to climate change. Thereafter, brief reviews on seven dominant processes of climate change, which are reported on by the newspaper articles will be discussed, with particular emphasis on the South African context (1906-1955), these are: (i) temperature variability, (ii) rainfall variability, (iii) El Niño Southern Oscillation (ENSO), (iv) natural disasters, (v) solar variability and (vi) desertification and anthropogenic activities.

The definition of contemporary climate change, based on scientific consensus, in its essential form is a natural gradual change in climate, changes in rainfall patterns, temperature and so forth (see IPCC, 2013). The IPCC (2013) differentiates between climate change attributed to human activities, such as GHG emissions from the burning of fossil fuels and climate change attributed to natural causes, such as volcanic eruptions. Furthermore, according to the IPCC (2013, 2014a, and 2014b), Africa is one of the most vulnerable continents to climate change impacts due to multiple social, economic and political stresses such as: developmental challenges, poverty, inequality, political instability and conflict resulting in a slow adaption to, or non-existent framework on climate change. Southern Africa in particular is expected to experience water stress, as rainfall patterns are projected to change, and rainfall is projected to decrease, impacting vital economic sectors, such as agriculture and ecotourism (IPCC 2013, 2014a, and 2014b). Thus, Africa's vulnerability as a whole to climate change is a driving factor to push for more climate change research in Africa, along with better adaptation and mitigation practices (IPCC 2013, 2014a, and 2014b).

(i) Temperature Variability:

The IPCC (2013) identified that on average global temperatures increased about 0.85°C from 1880 to 2012, and concluded that more than half of the observed increase in global average temperatures was caused by elevated emissions of GHGs. In corroboration, a trend of an increase in temperature, Tyson and Preston-Whyte (2001) also identified that over the period 1861-1980 the southern hemisphere averaged combined land-marine temperatures rose by 0.48°C as a result of climate change. Furthermore, Tyson and Preston-Whyte (2001) identified, based on extensive long-series annual temperature records, that in particular around 1920 the warmest conditions prevailed while cooler conditions prevailed in the 1960s and 1970s.

(ii) Rainfall Variability:

The effects of climate variability and climate change resulting in rising temperature, land, marine and atmospheric, also has an impact on temperature's interlinked variable: rainfall, the hydrological cycle (IPCC, 2013; Mosase and Ahiablame, 2018). With an increase in temperature an increase in evaporation will occur which will subsequently alter rainfall and runoff patterns and will increase an areas susceptibility

to flooding and drought (IPCC, 2013; Mosase and Ahiablame, 2018). Moreover, the impacts of the aforementioned increase in evaporation and changes in rainfall and runoff patterns will have an exacerbated effect on South Africa, a water scarce country (IPCC, 2013; Jury, 2017; Mbiriri *et al*., 2018; Mosase and Ahiablame, 2018). Furthermore, future projection models have shown that South Africa's rainfall will generally decrease overall (IPCC, 2013; Jury, 2017; Mbiriri *et al*., 2018; Mosase and Ahiablame, 2018). Specifically the western parts will become drier while the eastern parts, while having a decrease in rainfall overall, will suffer from more intense storm systems with the potential to cause flash floods (IPCC, 2013; Jury, 2017; Mbiriri *et al*., 2018; Mosase and Ahiablame, 2018).

Aside from climate change induced increase in temperature which impacts rainfall variability, other interlinked aspects of rainfall variability in South Africa are quasi-periodic rainfall oscillations (Tyson and Preston-Whyte, 2001). Due to the varying spatial and temporal scale of the various quasi-periodic rainfall oscillations, only one oscillation has been selected, chiefly due to its temporal scale spanning around a decade and its impact on South Africa's rainfall variability — the quasi-decadal oscillation (Tyson and Preston-Whyte, 2001; Jury 2015). These quasi-decadal oscillations are argued to fluctuate between 9 and 12 years, with their fluctuations being influenced by other rainfall variability forcing such as the quasi-biennial oscillation and ENSO, the latter to be discussed in more depth (Tyson and Preston-Whyte, 2001; Jury 2015). Tyson and Preston-Whyte (2001) had a more apt period of analysis on quasi-decadal oscillations, 1905-1990, and for this reason their results will be used as a point of reference. Furthermore, Tyson and Preston-Whyte (2001) argue that since the beginning of the 20th century approximately nine quasi-decadal oscillations, comprised of continuously alternating above normal rainfall, wet, and below normal rainfall, dry, spells have occurred. Moreover, Tyson and Preston-Whyte (2001) argue that the the dry spells in general have been more persistently dry, below normal rainfall, when compared to the wet spells being persistently wet, above normal rainfall. These nine spells have been summarised in the form of Table 2.2.1 and will be chiefly referred to when discussing quasi-decadal cycles.

Table 2.2.1: Quasi-Decadal Cycles Based On Mean Annual Rainfall For The Period 1905/06—1989/90 (After Tyson and Preston-Whyte 2001, 322-323)

Period of spell	Type (Wet/Dry)	Additional details
1981/82–1989/90	Dry	Was dry over most of South Africa
1971/72–1980/81	Wet	High positive rainfall anomalies were experienced over most of South Africa—six consecutive years experiencing above normal rainfall
1962/63–1970/71	Dry	Uniformly dry
1953/54–1961/62	Wet	Generally wet, except for parts of the central interior and eastern area
1944/45–1952/53	Dry	This dry spell was exceedingly dry over the whole country
1933/34—1943/44	Wet	—
1925/26—1932/33	Dry	The driest spell on average
1916/17—1924/25	Wet	—
1905/06—1915/16	Dry	—

(iii) El Niño Southern Oscillation (ENSO):

As previously discussed, another rainfall variability forcing is that of ENSO. Scholes *et al* (2015, 19) provides a concise definition and implications of ENSO in a South African context:

> “El Niño and La Niña are alternate modes of Pacific Ocean circulation with worldwide climatic consequences. The effects are propagated into the Indian and Atlantic oceans via the atmosphere. In Southern Africa, El Niño years have historically been associated with drought, while La Niña years have delivered slightly higher than average rainfall” (also see Ahrens, 2009 for an in depth explanation and discussion of ENSO).

In order to identify early El Niño and La Niña events, pre-1950, and cross check their occurrences with the reporting of early climate change by articles under investigation the use of the Extended Multivariate ENSO Index (MEI) was used (Figure 2.2.2) (NOAA, 2011; Wolter and Timlin, 2011). Negative values of the MEI represent the cold ENSO phase, La Niña, while the positive MEI values represent the warm ENSO phase, El Niño (Figure 2.2.2) (NOAA, 2011; Wolter and Timlin, 2011). Based on the MEI, Table 2.2.2 was created to highlight particular past ENSO years, determined

from December-January-February (DJF), that correspond with the time period of investigation for this dissertation (1906-1955).

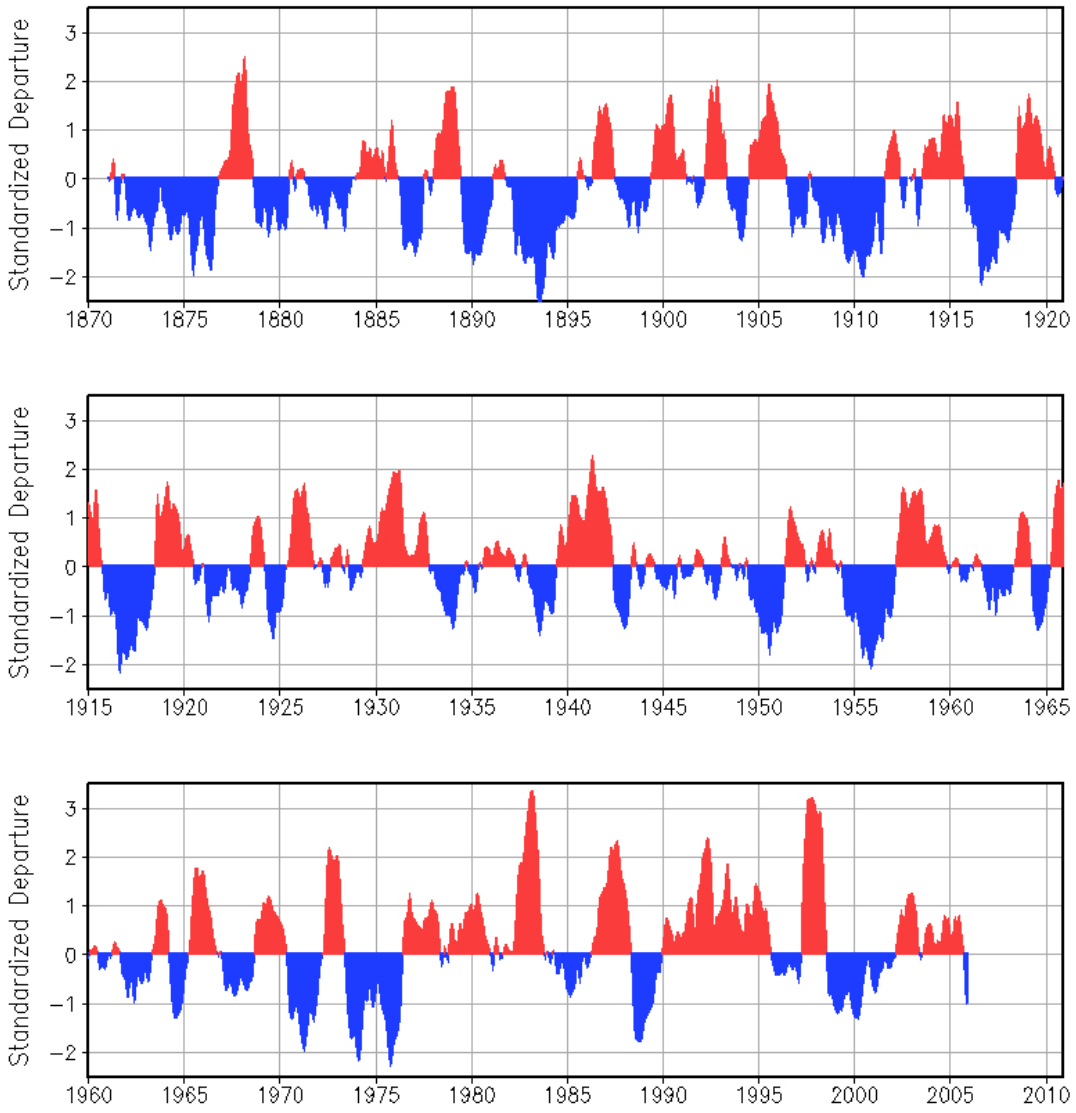


Figure 2.2.2: Extended Multivariate ENSO Index (MEI) (After Wolter and Timlin, 2011)

Table 2.2.2: Past ENSO years, 1906-1955 (After NOAA, 2011 and based on Wolter and Timlin's, 2011, MEI)

El Niño	Neutral	La Niña
1906	1905	1909
1915	1907-1908	1910
1919	1912-1914	1911
1926	1916	1917
1931	1920-1924	1918
1941	1927-1930	1925
1942	1932-1933	1934
	1935-1938	1939
	1940	1943
	1944-1949	1950
	1952-1954	1951
		1955

(iv) Natural Disasters:

Following brief discussion is on natural disasters and their potential impacts on South Africa. In terms of climate change induced natural disasters, South African coastal cities such as Cape Town, Port Elizabeth and Durban are particularly vulnerable, not only due to the geohazard risk associated with their topography, but also the natural disasters that can be exacerbated by climate change impacts, such as by sea level rise (Cartwright, 2008; Kron, 2013). Furthermore, the IPCC identifies that global tropical cyclone intensities will likely increase, due to climate change, anthropogenic warming in particular (IPCC, 2013). Alternatively, it must also be said that natural disasters also have the ability to be a negative forcing agent. A volcanic eruption, for example, can emit sulphur dioxide aerosols into the atmosphere and could produce a strong enough albedo effect to cool the Earth by 0.5°C for one or two years (see Ahrens, 2009, IPCC, 2013 and Scholes *et* al, 2015 for an in depth explanation on volcanic forcing).

(v) Solar Variability:

Milankovitch forcing, changes in the Earth's orbit, and solar variability play a significant role in the cooling and heating of Earth, both of which act as either a forcing agent or a negative forcing agent — the last 25 to 45 years this has shown to be generally negative for the latter (see Ahrens, 2009). Solar variability in particular has become an important aspect of enquiry in climatology, as climatologists remove various natural climate change drivers such as solar variability and volcanic forcing in order to establish and model the impact anthropogenic activities are having as drivers in the increase in climate change, essentially limiting the uncertainty of human induced climate change (Gray *et al*., 2010). Ironically, climate models can only reproduce late twentieth century warming when both anthropogenic and natural forcings are included (Gray *et al*, 2010, 40 — see Gray *et al*., 2010 and IPCC, 2013 for a more detailed overview of solar influences on climate). One popular aspect of solar variability which is covered by the newspaper articles under investigation are solar cycles, also called sunspot cycles, which are the ~11 year change in the sun's activity marked by either a notable increase or decrease in solar radiation, sunspots, solar flares and so forth (Ahrens, 2009; Gray *et al*, 2010; IPCC, 2013). Even small variations between cycles, solar irradiance in particular for example, can have a detectable effect on Earth's climate (IPCC, 2013). As a reference for the period under investigation, six solar cycles, numbered 14-19, occurred and were written about in the articles under further investigation, the sun cycles are summarised in Table 2.2.3 (WDC-SILSO, 2017).

Table 2.2.3: Solar cycles, 1906-1955 (After WDC-SILSO, 2017)

Solar cycle number	Start Period	Maximum
Solar cycle 14	1902 JAN — 1913 JUL	1906 FEB
Solar cycle 15	1913 JUL —1923 AUG	1917 AUG
Solar cycle 16	1923 AUG — 1933 SEP	1928 APR
Solar cycle 17	1933 SEP — 1944 FEB	1937 APR
Solar cycle 18	1944 FEB — 1954 APR	1947 MAY
Solar cycle 19	1954 APR —1964 OCT	1958 MAR

(vi) Desertification and anthropogenic activities:

Tolba (1986, 260 in Dean *et al*, 1995), identifies desertification as being "caused by excessive pressures of overuse on productive ecosystems that are inherently fragile".

These ‘excessive pressures of overuse’ relate to land use systems, which Tolba (1986) identifies as including: (i) deterioration of rangelands, (ii) degradation of rain-fed croplands, (iii) water-logging and salinisation of irrigated lands, (iv) deforestation and destruction of woody vegetation, (v) growth and encroachment of mobile sand dunes, and (vi) declining availability and quality of water supplies. Dean *et al* (1995) argue that two main shifts occurred in the study of desertification. First, the underlying causes of desertification has changed from casual factors such as overgrazing or climatic in nature which places emphasis on environmental ignorance and high population growth, especially amongst the rural poor, to structural factors such as inequality driven by political interference such as colonialism (Dean *et al*, 1995). Second, Dean *et al* (1998) argue that desertification’s definition has changed from one that only viewed its impacts as desert-like conditions advancing over arable land to one that includes general progressive land degradation.

Desertification in the semi-arid Karoo was reviewed and reassessed by Dean *et al* (1995), the Karoo of South Africa as a whole is made up of two biomes: the Nama-Karoo (eastern part with autumn and spring rainfall) and the Succulent Karoo (western part with winter rainfall). During the Quaternary, Dean *et al* (1995) argue that sedimentary sequences and fossil records suggesting that the Karoo contained a dynamic nature of the vegetation with very little evidence of anthropogenic vegetation, with shrubs favouring drier periods and grasses during periods of higher rainfall. Following colonial occupation, European nomadic graziers began moving into the interior with their flocks of sheep, from about 1850 onwards nomadic farmers began to permanently settle in the Karoo around dependable water supplies until the end of the 19th century (Dean *et al*., 1995). With an increase in human and subsequently livestock population growth, nomadic grazing become more difficult to practice (Talbot, 1961 in Dean *et al*., 1995). By 1865, some rangelands in the semi-arid Karoo became overstocked to capacity, showing signs of progressive degradation European settlers began to graze livestock in the southern Kalahari and by 1911 the Karoo and southern Kalahari were formally settled (Shaw, 1875; Talbot, 1961; Christopher, 1982; Dean and Macdonald, 1994 in Dean *et al*., 1995). Dean *et al* (1995, 251) argue that the spread of settlers into the Kalahari was “facilitated by improvements in the technology of well-drilling and water pumps (windmills)”.

For the early 20th century, Dean *et al* (1995, 251) argue that the passing of the Fencing Act of 1912, which "required framers to fence their properties" resulted in the uptake of rotational grazing and in turn also "made possible the over-utilization of patches, since livestock could then be confined to small areas". Dean *et al* (1995) further elaborate that the uptake of rotational grazing subsequently lead to the phasing out of the nomadic pastoral system which in turn resulted in prolonged grazing pressure on the veld and general progressive land degradation. Trends in stocking rates are argued by Dean *et al* (1995, 251) to have fallen, "implying a loss of usable primary productivity and the degradation loss of rangelands". Lastly, there is no clear position on whether the Karoo has undergone widespread degradation, due to conflicting and unreliable evidence (Dean *et al*, 1995).

Shifting the desertification discussion to the Kalahari, Mayaud *et al* (2017, 2) modelled responses of the Kalahari desert at three sites and found that "There was a clear upward trend in temperature at all sites". Moreover, Mayaud *et al*'s (2017) climate projections by simulations suggested that the Kalahari would experience climatically induced landscape change. However, with climate change impacts on vegetation cover and sediment mobility found to be relatively small, Mayaud *et al* (2017) argue that rather the largest culprit inducing landscape change in the Kalahari could be anthropogenic activities, primarily veld-burning and land use change which could exacerbate environmental and socio-economic consequences over the coming decades. Climate change is expected to result in a decrease in soil moisture in several semi-arid regions, including the Kalahari, and in corroboration with droughts are expected to result in an expanding desert (Wetherald and Manabe, 2002; Burke *et al*., 2006; Zeng and Yoon, 2009; D'Odorico *et al*., 2013). However, interestingly satellite imagery analysis has shown the opposite, as deserts in semi-arid regions, including the Kalahari, were found to be greening up instead of expanding (Helldén and Tottrup, 2008; D'Odorico *et al*., 2013).

2.3 A Brief History on the Development of the South African Press

"Freedom of expression has always been one of the hallmarks of democracy"
(Dawson, 2004, 225).

Of the South African media: broadcasting, the press and film, the press has the longest history, and unlike broadcasting in South Africa, with its strong alignment with

governmental ideology, "there has always been a strained relationship between the press and the government of South Africa" (Wigston, 2001, 34). This ‘strained relationship’ according to Jones *et al* (2008) is rooted in the constant threats of restrictive legislation, shifting according to political developments beginning with the arrival of Jan van Riebeeck at the Cape in 1652 and continuing to present democratically elected leaders. Furthermore it must be noted that the development of the South African press has been dominated by white minority control and subsequently white language groups, with very different cultures, political philosophies, and economic interests (Hachten & Giffard, 1984; Jones *et al*., 2008). The South African press’s dominance by white ownership and the English and Afrikaans language is argued by Hachten & Giffard (1984) to have suppressed the development of the black press resulting in the black press having to develop from within the confines of the English and Afrikaans press, such as black journalists working for white owned English/Afrikaans newspapers in the late 20th Century (Hachten & Giffard, 1984; Jones *et al*., 2008).

Roelofse (1996), identifies five themes that run through the history of the South African press: (i) there is a tension and conflict between government and the press, (ii) divisions in the press are based on language, (iii) further divisions in the press are based on race, (iv) the state sees the press as a threat to peace and security, and (v) efforts by journalists to circumvent undemocratic laws (Roelofse, 1996). As a result of the themes previously mentioned, it is difficult to identify distinct periods as the development of the South African press does not follow a single linear path (Wigston, 2001). In order to address this issue and following the methodology of Wigston (2001), the press will be divided into three distinctive strands; the English press, the Afrikaans press and regional press developments. Thereafter, a brief review of the newspapers analysed for this dissertation will take place.

2.3.1 The Development of the English Press

The birth of the South African press, locally produced newspapers, did not emerge until a century and a half after Jan van Riebeeck's occupation of the Cape, as the Dutch East India Company "perceived the press as a potentially revolutionary instrument" (Wigston, 2001, 35). News and views were published through Dutch newspapers such as the *Post van der Neder-Rijn and Suid-Hollandsche Courant* (Fourie, 1994). The Dutch ceded the Cape to the British military rule in 1795, giving

way for the first local publication to come to fruition; the *Cape Town Gazette and the African Advertiser/Kaapsche Stads Courant en Afrikaansche Berigte*, which was first published on 16 August 1800 (Wigston, 2001). "The paper appeared mainly in English and was printed on a government-owned press at the Castle", containing only official notices and advertisements, and it was strongly controlled, by the then governor, Lord Charles Somerset (Wigston, 2001, 35). With government officials steadfast in their belief in seeing the press as a revolutionary instrument, private newspapers were prohibited unless published by missionaries (Diederichs, 1993; Wigston, 2001).

In 1824, nearly a quarter of a century after the launch of South Africa's first local publication, the first non-government newspaper, *The South African Commercial Advertiser*, appeared on 7 January 1824 in Cape Town, and mainly in English (de Kock, 1982; Wigston, 2001). However, the freedom of the first unofficial publication was short lived, as *The South African Commercial Advertiser* started covering events in the law courts (de Kock, 1982; Wigston, 2001). Wigston (2001, 35), identifies one case in particular: "concerning the malpractice of the disposal of slaves by the local customs officer", whereby Lord Somerset intervened in order to predetermine the outcome, and fearing his actions would result in press coverage he confiscated the eighteenth edition and suspended the publication. Furthermore, Lord Somerset ordered that the publication submit page proofs for censorship (de Kock, 1982, 46-47; Wigston, 2001). The editors, Thomas Pringle and John Fairbairn honoured as South Africa's first journalists, refused to comply leaving the government to subsequently seal the fate of the paper (de Kock, 1982, 46-47; Wigston, 2001). Furthermore, Lord Somerset took his punishment a step further by banishing the owner, George Greig, from the colony "for subversion and sedition" (de Kock, 1982, 47; Wigston, 2001). Some two months after starting the *Commercial Advertiser,* Pringle and Fairbairn together with the Reverend Abraham Faure, started a bilingual periodical, *The South African Journal and Het Nederduitssch Zuid Afrikaansch Tydschrift*, with the first edition being published on 5 March 1824, printed reluctantly by the Government Press as the content related to constitutional matters, and in later issues, the freedom of the press (Wigston, 2001). By mid-May 1824, the editors were warned by authorities that the publication could only continue provided that they cease their criticism of the authorities, Pringle refused and the publication was subsequently closed down (Wigston, 2001).

Greig returned to the Cape and revived the *Commercial Advertiser* on 31 August 1825 with Fairbairn as editor, only to be suspended 19 months later (Wigston, 2001). Thereafter, Fairbairn reprinted an article from *The Times* without acknowledgement, the article depicted the Lord Somerset as vindictive, leading Lord Somerset to complain to Bathurst, the British Secretary of State for the colonies, which after 10 months the complaint then resulted in the cancelation of the *Commercial Advertiser*'s licence, only to be followed by a third revival on 3 October 1828 after an appeal (de Kock, 1982; Wigston, 2001). The departure of Lord Somerset from the Cape on 5 March 1826 was seen as the start of a significant shift in the ideology of the British Government, as the British Government realised that conflict in the Cape could not be resolved unless there was press freedom (Wigston, 2001). On 30 April 1829, Ordinance No. 60 was signed, regarded as the Magna Carta of South African press freedom by Cutten (1935) and de Kock (1982), the most prominent aspect of the proclamation was that in order for governmental authorities to take action against publications they had to prove that statements made were false (Wigston, 2001). The signing of the Ordinance and Fairbairn's dogged pursuit is argued by Wigston (2001), as being the catalysts that ushered in an array of new publications across South Africa.

The second major event to happen within the development of the English press and the South African press as a whole, alongside press freedom, is argued to be by Wigston (2001), the arrival of British settlers in 1820, who brought their own printing presses and expertise with them. As a result, by the end of the nineteenth century, the majority of towns had their own local newspapers, and unlike Fairbairn and Pringle's push for press freedom, the local press editors rather focused on championing the causes of the British settler and Dutch farmer (Diederichs, 1993; Wigston, 2001). Aside from providing the necessary infrastructure and establishing press freedom, to paraphrase Roelofse (1993, 73), further contributions made by the British include: (i) the arrival of editors with robust journalistic backgrounds, fostering the formation of excellence and professionalism on which South African journalism is based, (ii) a dynamic shift in the production and distribution model of newspapers, from relying solely on subscription fees and single purchases, to a commercialism and free-market approach whereby a strong emphasis was placed on advertising revenue, and lastly (iii) a promotion of Britishness in South Africa, which ultimately led

to the alienation of Afrikaner and black South Africans who saw this as colonialism, whereby English journalists tended to ignore the plight of Afrikaners and completely disregard black South African's claims to independence, autonomy, and political participation. In sum, Wigston (2001, 37) argues that ultimately "The English left an indelible stamp on the development of the press in South Africa."

2.3.2 The Development of the Afrikaans Press

Unlike the development of the English press, the Afrikaans press remained passive and somewhat dormant for a long period of time, ascribed to the inherent understanding of freedom by the Afrikaner (Roelofse, 1996; Wigston, 2001). Freedom for the Dutch Afrikaner stemmed from the authority of and obedience to the state, while for the English their concept of freedom stemmed from value being placed on the individual with the state acting as an extension of the individual (Roelofse, 1996; Wigston, 2001). Roelofse (1996, 74) argues that "This distinction continued to influence the approaches adopted by the press right through the twentieth century." Furthermore, Wigston (2001) attributes the establishment of South African Dutch/Afrikaans newspapers as a reaction to the liberal and traditionalist English views of editors such as Fairbairn in the *South African Commercial Advertiser*, which addressed issues such as slavery, tensions between the Dutch farmers and the Xhosa, and the work of missionaries.

The founder of the Afrikaner press Josephus Suasso de Lima, who was dismissed by the Dutch East India Company for the misuse of documents, established a weekly Dutch newspaper *De Verzamelaar* in 1826 (Roelofse, 1996; Wigston, 2001). *De Verzamelaar* continued for some 22 years, dogged by financial issues and was eventually purchased by de Lima's rival Charles Etienne Boniface (de Kock, 1982; Roelofse, 1996; Wigston, 2001). However, it was not until the establishment of *De Zuid-Afrikaan* on 9 April 1830 by Christoffel Joseph Brand, that the plight of Dutch/ Afrikaner interests were brought into public view (Wigston, 2001). *De Zuid-Afrikaan* and the *Commercial Advertiser*, under Fairbairn, clashed bitterly in the public's view on contentions issues ranging from that of slavery to the Voortrekkers (Wigston, 2001). In 1894, *De Zuid-Afrikaan* merged with *Ons Land*, which then ceased publication in 1930 as a result of competition from the *Nationale Pers'*, National Press', *Die Berger*, which started in 1915 (Engelbrecht 1972; Fourie, 1994). Roelofse (1996, 74) attributes three enduring trends within the development of the Afrikaans

press which were set by *De Zuid-Afrikaan*: (i) its commitment to the cause of the Afrikaans-speaking Africans and Afrikaners in a British colony, (ii) its promotion of the cause of the Afrikaans language and those that speak it, and lastly (iii) to play a visible and opposing role on a political, economic, and socio-cultural level against the English press.

Die Afrikaanse Patriot, first published in Paarl on 15 January 1876, is also argued as playing a vital role in promoting Afrikaans as a language, eventually becoming a newspaper of contention as Afrikaans was considered a 'kitchen' language by the Dutch (de Kock, 1982; Diederichs, 1993; Wigston, 2001). The level of contention grew and manifested into action through the Synod of the Dutch church which forbade its congregants to read and/or write for *Die Afrikaanse Patriot* (Cutten, 1935; Wigston, 2001). Another example of this contention is highlighted by a rival newspaper *Cradocksche-Afrikaner*'s scathing statement that only the semi-educated would be delighted with it (Cutten, 1935; Wigston, 2001). "Because of the intense opposition to written Afrikaans, subscribers and contributors had to write, in a clandestine fashion, via *De Zuid-Afrikaan* in Cape Town" (de Kock, 1982, 91). *Die Afrikaanse Patriot*'s popularity grew, by its second year as it became a weekly, and by the third year its subscriptions rose to 3000, predominantly from support of Afrikaners living in the British annexed *Zuid-Afrikaanse Republiek* (Wigston, 2001). Furthermore, Wigston (2001) declares that *Die Afrikaanse Patriot* was a mouthpiece of the *Genootskap van Regte Afrikaners* (Association of Genuine Afrikaners), later known as the *Afrikanderbond*. Its support dwindled after 1892 due to its owner's support of Cecil John Rhodes against Paul Kruger, in addition to dwindling support influential members of the *Genootskap* resigned and withdrew their capital in an attempt to change the policy of the paper, without much success and eventually leading to the papers demise in 1904 (Cutten, 1935; de Kock, 1982; Wigston, 2001).

In later years, following the establishment of the apartheid regime (1948-1993), van der Waal (2008, 61-62) argues that Afrikaner nationalism emerged as “… an ethnic process amidst the broader conditions of interacting and competing forces during the period of British imperialism” — whereby the formation of the National Party (NP) and with the support of “… the Afrikaans churches, the Christian Nationalist schools and the Dutch (later Afrikaans) newspapers were very important tools in the formation of an Afrikaner ethnic consciousness.” Governmental officials sought to further their

control over all forms of the South African media, for example, the United Party (UP) under the leadership of General Smuts, initiated a monopolistic policy of the media in South Africa, resulting in a strong position of the South African Broadcasting Corporation (SABC) from 1936 as other broadcasters were largely restricted (Wigston, 2001).

In summary, according to Roelofse (1996), the development of the Afrikaans and English press differs in four key areas, of which some areas endured well into the twentieth century. To paraphrase Roelofse (1996, 75), unlike the English press the Afrikaans newspapers were: (i) not developed by professional journalists, rather the result of ministers of religion in most cases committed to Calvinistic ethics, (ii) not primarily driven for commercial gain, rather to promote the plight of the Afrikaner; a trend that is argued to only have changed in the 1970s when *Nasionale Pres* (National Press) expanded into the Transvaal resulting in many of the early Dutch and Afrikaans newspapers folding, (iii) the promotion of Afrikaans as a language, Afrikaner political independence and the perceived threat of black nationalism became enduring themes, and lastly (iv) whereas the English press reported on British affairs, the Afrikaans press focused on the affairs of Afrikaners and South Africa.

2.3.3 Regional Developments of the South African Press

De Natalier, a four-page weekly mostly in Dutch with scatterings of English was the first newspaper of Natal, now known as KwaZulu-Natal (KZN), it appeared on 15 March 1844, later closing in 1846 following a case of libel (Wigston, 2001). *The Natal Witness*, quickly replaced *De Natalier* in 1846, then a bilingual weekly paper, and is the oldest newspaper still in publication, currently known by its rebranded name *The Witness* (Cutten 1935; Leahy and Voice, 1992, Wigston, 2001). Cutten (1935), identified serval smaller newspapers in KZN, with a large portion of them springing up between 1850-1859, nevertheless, most were closed by 1860 due to poor levels of readership. In addition, the smaller newspapers did not share the bilingualism characteristic that made up Cape and Transvaal newspapers (Wigston, 2001). Other prominent Natal newspapers included the *Natal Mercury*, 1852, and *The Daily News*, 1878 first under the name *Natal Mercantile Advertiser* (Wigston, 2001).

The first publication to appear in Transvaal, an amalgamation of provinces now known as Gauteng, Limpopo, Mpumalanga, and parts of the North West, was the *Government Gazette*, 25 September 1857, which later became known as *Gouvernements Courant der ZAR* (Cutten, 1935; Diederichs, 1993). However, the first locally produced Transvaal newspaper, *De Oude Emigrant*, only started publication on 15 October 1859 in Potchefstroom, the then capital of the *Zuid-Afrikaanse Republiek* (Wigston, 2001). *De Emigrant*, emerged three years later, following the collapse of *De Oude Emigrant* nine months earlier, which is argued by Cutten (1935) and Wigston (2001) to have brought the profession of journalism into disrepute with its insulting articles. Other prominent Transvaal newspapers included the *Staats Courant* in 1863 and the *Transvaal Argus* in 1866, later renamed to the *Transvaal Advocate* and due to the publication being in English its circulation was limited resulting in a difficultly in balancing the sheets, which later collapsed (Cutten, 1935; Wigston. 2001). Wigston (2001), argues that the only Transvaal newspaper of any significance was *De Volkstem*, appearing on 8 August 1873, later to become known as *Die Volkstem* in 1922 and continuing until its closure in 1951, the paper was also absent from circulation for a brief period in 1880, during the Anglo-Boer War (Cullen, 1935; Leahy and Voice, 1992).

Following the mining boom and subsequent establishment of the city of Johannesburg in 1886, an increase in population, resulted in an increase in the demand for newspapers (Wigston, 2001; South African Media, 2016a). Ironically, several newspapers appeared that had close ties with the mining industry — the first, *Diggers' News* from 24 February 1887 and a day later *The Mining Argus* (Wigston, 2001; South African Media, 2016a). In March of 1887, the *Standard and Transvaal Mining Chronicle* began, which later amalgamated with the *Digger's News*, to later be followed by the *Transvaal Observer* (Wigston, 2001). *The Eastern Star*, established in 1887, moved to Johannesburg from Grahamstown where it rebranded itself as *The Star* and appeared as an evening newspaper on 3 April 1889 (Wigston, 2001; South African Media, 2016a). *The Star* became South Africa's most popular and biggest daily, up and until 1991, when it was succeeded by competitor newspaper, *The Sowetan* (Wigston, 2001; South African Media, 2016a).

On 10 June 1850, the Free State witnessed the birth of its first local publication *The Friend of the Sovereignty and Bloemfontien Gazette*, four years later following Free

State independence changed its name to *The Friend of the Free State*, only to later shorten it again to *The Friend* (Wigston, 2001). For a short period during the British occupation of the Free State the paper was edited by the famed author and Nobel prize laureate Rudyard Kipling, arguably his most popular work being the Jungle Book (Wigston, 2001). After 130 years of publication *The Friend* closed in 1985 (Wigston, 2001). Other prominent newspapers that developed from the Free State included: *Governments Courant* in 1857, followed by the first Dutch newspaper, *De Tijd* in 1862, and *De Express en Oranje Vrijstaats Adertentieblad* published on 11 March 1876, which was later closed by military authorities in 1900 for showing allegiance to the British during the Anglo-Boer War, *The Daily News* (1882), *De Burger* (1915), and *De Fakkel* (1877) (Cutten, 1935; Oberholster, 1963; Wigston, 2001; Pretorius, 2014). In reflection, Wigston (2001) argues that the level of development of Free State newspapers did not reach the same levels such as those found in the Cape, Natal or Transvaal. This is postulated due to the aforementioned reasoning by Roelofse (1996), that the Afrikaans press was not intended to be a well-oiled capitalist machine but was rather an instrument used to promote the plight of the Afrikaner.

2.3.4 A Brief History of the Newspapers Analysed

For the research period, 1906-1955, the SAWS archive contained articles that discussed early climate change published by a total of 17 English South African newspapers with eight newspapers meeting the criteria of this research. It must be stated that the nine newspapers that failed to meet the criteria of this research will not be discussed further, they are: *The Midland News, The Natal Witness, The Natal Mercury, The Daily Harald, The Eastern Province Harald, The Friend, The Sunday Express, The Cape Times* and *The Army News*. The eight English newspapers that met the criteria will be briefly discussed in this subsection, with the exception of *The Star* as it was discussed previously in Subsection 2.3.3, they are: *The Cape Argus, The Daily Dispatch*, *The Graaff-Reinet Advertiser, The Northern News, The Pretoria News, The Rand Daily Mail* and *The Sunday Times* with important aspects being summarised in Table 2.3.4, these aspects include the newspapers' alternative names, run, distribution and distribution area and the newspapers' political alignment.

Table 2.3.4: An Overview of Newspapers Analysed (After Hachten & Giffard, 1984; Wigston, 2001; South African Media, 2016a & 2016b; Rubin, 2017; Williams, 2018)

Newspaper	Alternative Names	Run	Distribution & distribution area (1906-1955)	Political Alignment (1906-1955)
The Cape Argus	*The Argus*	3 January 1857-Present	Daily, The Cape	Liberal
The Daily Dispatch	*The East London Dispatch and Shipping and Mercantile Gazette,* and as *The East London Dispatch*	1872-Present	Daily, The Cape and Natal (1898-present, was bi-weekly)	Liberal
The Graaff-Reinet Advertiser	—	Unknown-Unknown	Weekly, local to Graaff-Reinet (community newspaper)	Unknown
The Northern News	—	Unknown-Unknown	Weekly, local to Vryburg (community newspaper)	Unknown
The Pretoria News	—	1898-Present	Daily, Transvaal and parts of Natal	Independent
The Rand Daily Mail	*The Mail / The Daily Mail*	1902-1985 (resurected as an online news-site in October 2014)	Daily, throughout South Africa	Liberal
The Star	*The Eastern Star*	1887 (as *The Eastern Star),* 3 April 1889 as *The Star*-Present	Daily, throughout South Africa	Liberal
The Sunday Times	—	1906-Present	Weekly, throughout South Africa	Conservative/ Centre-right

On the 3rd of January 1857, *The Cape Argus* was launched “by three partners: Saul Solomon, a liberal politician, Richard W. Murray, a journalist, and Bryan H. Darnell, also a politician, but more conservative” and modeled on the *The Times of London*, also a daily afternoon newspaper (South African Media, 2016a; Rubin, 2017). The political differences between the partners is argued, according to South African Media (2016a), to have created a problem in setting the newspapers agenda, political alignment in particular, for the newspaper as Solomon was a staunch supporter of women’s rights and multiracial democracy, while Murray and Darnell were pro-

imperialists, which was viewed as unpopular for that time. Murray and Darnell realised that their views were unpopular and had a negative impact on the newspaper's readership, they then decided to depart to the Transvaal after selling their shares in the newspaper (South African Media, 2016a). Under the leadership of Solomon as sole owner, the political agenda of the paper changed to liberal which remained throughout the papers run — a decision which is argued to have driven the paper to be the top newspaper in the province and subsequently increased its influence (South African Media, 2016a). *The Cape Argus* was briefly renamed *The Argus* for during the late 1960s as a way of rebranding itself, before reverting back to its original name (see South African Media, 2016a and Rubin, 2017 for an in depth history on *The Cape Argus*).

The Daily Dispatch, originally launched as *The East London Dispatch and Shipping and Mercantile Gazette*, on 10 September 1872 in King William's Town (Williams, 2018). The newspaper started as a four-page tabloid which was published bi-weekly and according to Williams (2018), "As was customary in that period, the front page carried only advertisements – news did not make the front page of the Dispatch until November 1 1955, when its lead story was about troubles in the then French-ruled Morocco". During the first ~25 years of the newspapers existence several editors and owners made various changes according to their liking, it was not until Will Crosby, a 'liberal' journalist for that time, was made editor that the paper changed from a bi-weekly to a daily, in a push for profitability — 5 January 1898 saw the first daily publication of *The East London Dispatch* (Hachten and Giffard, 1984; Williams, 2018). The liberal agenda remained central to the newspaper, *The Daily Dispatch* along with *The Rand Daily Mail* are argued to have been the loudest mouthpieces for mainstream critique of the Apartheid government, especially under the editorship of Donald Woods (Hachten and Giffard, 1984 and see Williams, 2018 for an in depth history of *The Daily Dispatch*).

A handful of articles published by *The Graaff-Reinet Advertiser* and *The Northern News* were present in the archive under investigation, unfortunately not much is known about the newspapers, the following information was extracted from the articles present in the archives: (i) both newspapers are community newspapers — local, the former's distribution area being Graaff-Reinet and the latter being Vryburg and (ii) both newspapers were published weekly. Moreover, researching the

newspapers have provided no further information other than online news sites with similar names, such as *Graaff-Reinet Advertiser*, *Graaff-Reinet Advertiser & Karoonuus* and *Northern News/Noord Nuus* and a second website also called *Northern News*, no connection between online sites and the newspapers themselves could be established and verified at the time of writing.

As previously discussed, following the mining boom and subsequent establishment of the city of Johannesburg in 1886, several newspapers moved to or developed out of Johannesburg and its surrounding areas (Hachten and Giffard, 1984; Wigston, 2001; South African Media, 2016a). Aside from *The Star*, two other daily newspapers emerged, *The Pretoria News*, *The Rand Daily Mail* and one weekly newspaper, *The Sunday Times*. *The Pretoria News* celebrated its 120th anniversary of its first publication in 2018, first published in 1898, it was and still is seen as an independent newspaper which predominantly covered localised and political events that occurred in the capital, later in 1925 to be acquired by the Argus company in a push for media dominance (Hachten and Giffard, 1984). Furthermore, *The Rand Daily Mail*, also colloquially referred to as The Mail, was founded and developed in Johannesburg in 1902, argued to have been one of the loudest mouthpieces for mainstream critique of the Apartheid government — later ceasing publication due to government suppression (Hachten and Giffard, 1984; Williams, 2018). Ironically, *The Rand Daily Mail* inadvertently lead to the development of *The Sunday Times.* After the *The Rand Daily Mail's* founder, Freeman Cohen, died Dutch nationalists tried to buy the paper and change its liberal editorial policies but was outbid by Sir Abe Bailey who would later leave the *Mail* in what Hachten and Giffard (1984, 39) argue to be a 'syndicate' that in 1906 launched *The Sunday Times.* "Like the Mail, it professed to be 'loyal to the fingertips, and Imperialistic to the backbone. But it vowed to steer an 'independent course during the coming political storm in the Transvaal.'" (Hachten and Giffard, 1984, 39). *The Sunday Times* was first published on 4 February 1906 by George Herbert Kingswell, the Founding Editor, whilst remaining centralist throughout its run and later spawning several sister publications, including *The Times*, *The Business Day*, *The Financial Mail* and *The Sowetan* (South African Media, 2016b).

2.4 Important Political Events in South Africa's History (1880s-1960s)

As discussed in the previous subsection, the developments of the South African media cannot be divorced from the political developments occurring at the same

time. The difficulty in writing this following review lies in the selection of what political developments should be covered and therefore which political developments should be excluded. Before continuing, it must be restated that it is encouraged that further individual investigations take place into the various political developments of South Africa. It is argued that based on the analysis of the subject matter covered and the types of influencing drivers in the reporting of climate change discourse by the South African media, which includes politicians among others, that major political events should be briefly reviewed for the period 1880-1960. What is considered as a major political event for this brief review is primarily based on the South African political leadership of that time and political unrest resulting from threats of war and subsequent war itself. The major political events to be discussed hereon will include those which occurred between the closing decades of the 19th century (1880), particularly on the South African War and the unification of South Africa, and up and until the mid 20th century (1961) (outlined in Table 2.4.1).

The closing decades of the 19th century was, according to Landau (2010), unkind to most of the people of the highveld, with those of the ‘Middle’, or Caledon River Valley experiencing drought, famine, disease, and warfare. Moreover, seigneurial forms of exploitation was occurring, this was partly attributed to attenuated chiefs making bad land deals or falling victim to outright swindling, the results of which weakened their positions and negotiating power, and triggered sporadic rebellions which were suppressed (Landau, 2010). European rule expanded into the interior of the continent partially driven by the discovery of gold in the Transvaal in 1886, which is argued by Stapleton as leading to a “rapid shift in regional economic power from the British-dominated coast [Natal and Cape Colonies] to the interior Boer republics of the Transvaal and the Orange Free State” (2010, 86). The Transvaal government, under President Paul Kruger (1883-1902), increased its economic wealth by taxing the fast-growing mining sector (Stapleton, 2010). Furthermore, the Transvaal Boers had intermittent success in resisting British imperial control (Landau, 2010). In order to compete with the Transvaal’s mining industry and subsequent increase in tax collections, during the early 1890s, Cecil Rhodes, the Prime Minster of the Cape Colony (1890-1896), embarked on the colonial conquest of the territory of Southern Rhodesia (Zimbabwe), largely because he mistakenly believed it contained a large gold deposit (Stapleton, 2010). “Broadly speaking, the object of the war for the British was to unify a European leadership in South Africa under British guidance and

stabilise the exploitation and marketing of mineral wealth; the object for the Republics was to repel the British and to maintain and extend their own dorms of sovereignty" (Landau, 2010, 179). Stapleton (2010) further describes how the pretext for war unfolded between the British and the Boers as follows:

> "In 1895 tensions between the British and the Boers were enflamed by the Jameson Raid, Rhode's failed attempt to overthrow the Kruger regime by invading the Transvaal. … The imperial British government used the issue of the *uitlanders*, white foreigners who had come into the republic because of the gold rush, to undermine the Transvaal state and create a pretext for war. The British knew that if the *uitlanders*, mostly British in origin, were given the vote, they would bring about a pro-imperial government in the Transvaal. The Boers, however, did not want to meekly surrender their independence" (Stapleton, 2010, 86)

In 1899, the *uitlander* issue could not be settled diplomatically, with tensions high and the fear of impending war, between May and before the start of the war in October 1899 around 100000 blacks and 100000 foreign whites fled the Transvaal for the Cape and Natal Colonies (Stapleton, 2010). In October 1899, the two Boer republics, Transvaal and the Orange Free State, launched a pre-emptive strike on British territories, marking the start of the South African War (Stapleton, 2010). The scattered British force being defeated after the pre-emptive strikes then retaliated with the arrival of a large reinforcement force of over 100000 and "By the end of August 1900, Boer forces had been divided into three rough groups. De la Rey in the western Transvaal, Botha in the eastern Transvaal, and De Wet in the Orange Free State. Constantly on the run, they attacked trains, cut telegraph wires, burnt stores, bombarded isolated posts, and temporarily occupied small towns. The guerrilla phase of the conflict had begun" (Stapleton, 2010, 101). "Boer leaders were divided, with Smuts and Botha favouring negotiation, Steyn [President of the Orange Free State], De la Rey, and Hertzog wanting to continue the fight", however, by April 1902 talks between the British and the Boers were reopened (Stapleton, 2010). Peace talks were held at Vereeniging, from May 15 to 31, 1902 (Stapleton, 2010, 106). The Boers wanted the republics to remain independent and the British rejected this demand, on the last day of the peace conference the Boer delegation conceded independence, while the British concessions included: "the return of all prisoners, a general amnesty,

protection of property rights, non-punitive taxation, up to £3 million toward reconstruction, the promise of eventual self-government, assurances that black political rights would not be extended north from the Cape, and protection of the Dutch language" (Stapleton, 2010, 106). The assurances that black political rights would not be extended further, further disenfranchised blacks as despite African imperial loyalty the British Government's paramount concern was that of white unity in South Africa, resulting in the Act of Union, which "not only removed the theoretical right of enfranchised blacks to be elected to parliamentary seats (which had existed in the Cape) but also provided for the removal of the franchise from African voters through a two-thirds majority vote of both houses of parliament in joint session" (Lodge, 1983, 2).

Table 2.4.1: Important Political Events in South Africa's History (After Thompson, 2001; SAHO, 2009 and Worden, 2012)

Year	Chronological outline (1899-1960)
1899-1902	South African War: British conquest of Transvaal and Orange Free State. Peace Treaty of Vereeniging signed
1909	The South Africa Act was passed by the British Parliament, paving the way for the unification of South Africa.
1910	Union of South Africa is established. First general election, SAP wins, Botha becomes Prime Minister.
1915	South Africa invades German South-West Africa. Second general election takes place which resulted in SAP, under Botha, retaining power. In 1919, Botha died in office and Smuts became interim Prime Minister.
1920	The third general election, NP wins majority of seats, SAP under Smuts enters coalition with TUP permitting Smuts to become Prime Minister.
1921	Fourth general election SAP is forced to fuse with TUP enabling Smuts to return as Prime Minister.
1924	Fifth general election, the coalition of LP and NP win the election, PACT Government, led by Hertzog.
1929	The sixth general election was centred on strategies of dealing with the impending crisis, the Great Depression (1930-1933). The PACT government collapsed as a result of differing views and resulted in the NP winning the election, Hertzog returns as Prime Minister.
1933	Seventh general elections, SAP the NP form a coalition, under Hertzog. SAP (under Smuts) and NP (under Hertzog) fused into the UP (1934).

Year	Chronological outline (1899-1960)
1938	Eighth general elections, UP under Hertzog retains power following this general election. World War II breaks out 1939 and Hertzog's neutral stance causes contestation in the UP, resulting in his departure and Smuts replaces him.
1943	Ninth general election, the UP led by Smuts once wins this election, but the NP showed signs of growing.
1948	Tenth general elections, The NP, under Malan forms government following the election. The NP begins to apply its policy of apartheid.
1953	Eleventh general elections, an election that returned the NP to power, emboldening it to pass some of the most draconian measures of the decade under Malan.
1958	Verwoerd left office in 1954, Strijdom takes over as Prime Minister and goes on to win the twelfth general election in 1958. Shortly after the election following the death of Strijdom, Verwoerd takes over as interim Prime Minister (1958-1961).

In 1909, The South Africa Act was passed by the British Parliament which resulted in both the former British Cape and Natal Colonies and the two former Boer republics, the Transvaal and the Orange Free State, combining to form the self-governing Union of South Africa (Lodge 1983: Stapleton, 2010; SAHO, 2011). Subsequently, the first general election followed in 1910, only white males and a small fraction of black and coloured men were allowed to vote for white male representatives (SAHO, 2009; Stapleton, 2010; SAHO, 2011). The small fraction of black and coloured men from the Cape and Natal were allowed to vote under a 'colour-blind' permission based on property requirements (SAHO, 2009; Stapleton, 2010; SAHO, 2011). The first post-Union administration, under Louis Botha (1910-1915) of the South African Party (SAP), responded "to the mining industry's labour demands and the disquiet of white farmers squeezed between capitalist agricultural companies on the one hand and competitive African peasants on the other, moved quickly to safeguard its position with these groups" (Lodge, 1983, 2). Lodge (1983) further describes the governments responses:

> "Breaking contract was made a criminal offense under the Native Labour Regulation Act, the exclusion of Africans from skilled industrial jobs was for the first time given legal sanction in the Mines and Works Act, and in 1911 the Natives' Land Bill was drafted: it prohibited rural land ownership by Africans or occupation outside the 'reserves; (which comprised nearly eight per cent of the area of the country), dispossessing many landowners

> and outlawing leasing or tenant-farming relationships between blacks and whites" (Lodge, 1983, 2).

Before the second general election, 1915, South Africa's participation in the First World War was a contentious issue (SAHO, 2009; Stapleton, 2010). "Like other dominions, South Africa entered the Great War through Britain's declaration of hostilities against Germany in 1914", under Prime Minister Botha and Defence Minister Smuts, as per British request, South Africa began invasion preparations for German South West Africa (Namibia) (Stapleton, 2010, 116). However, Hertzog and his newly formed National Party (NP), 1914, "objected to any support of British imperialism and fondly remembered German empathy during the South African War" (Stapleton, 2010, 116). These feelings of distain for British imperialism and empathy for a 'supportive ally', Germany, were shared amongst high ranking officials in the Union Defence Force, such as Commandant-General Beyers, who resigned and met to form a rebellion with their intention to conduct a military coup for September 15, 1914 (Stapleton, 2010). Preparations for the coup were abruptly cut short when Beyers and De La Rey decided to run a police road block on the way to Potchefstroom to meet with fellow coup supporters, resulting in De La Rey being shot and killed and rebellion members, most notably Beyers, wanting to end their support of a coup (Stapleton, 2010). Stapleton (2010) details the unfolding of the 1914 rebellion as follows:

> "Botha himself now took command of the Union Defence Force and rallied subordinate officers for a campaign in South West Africa. When the South African invasion of the neighboring German colony began in early October, the Upington force under Manie Maritz, a former ''bittereinder'' who had fled to South West Africa in 1902 rather than surrender, did not move as instructed that left another advancing column, ''A Force'' under Major General Lukin, dangerously exposed on its flank. In fact, Maritz had been one of the coup plotters and now declared South Africa independent, disarmed loyalist soldiers under his command, promoted himself to general, and made his own treaty with the Germans. On October 11, Smuts declared martial law with strict press censorship, a ban on public meetings, and collection of arms and ammunition. Hertzog's Nationalists avoided direct involvement in the rebellion but sympathized with it. By the

> end of October 1914, a total of around 11,500 armed Boer rebels had been mobilized by De Wet in the Orange Free State, and Beyers and Kemp in the Transvaal. Although they briefly occupied towns and ambushed trains, the rebels lacked overall coordination. Rejecting offers of imperial assistance or the recruitment of black soldiers, Botha decided to use his force of 32,000 loyalists, mostly Afrikaners, to crush the rebellion. Botha first concentrated on the Orange Free State and, on November 12, attacked a force of 5,000 rebels under De Wet at Winburg. Partly encircled, most of the rebels surrendered though De Wet escaped only to be arrested near Kuruman in early December. … On January 30, 1915, Kemp and most remaining leaders surrendered to government officers near Upington. The rebellion then fizzled with Maritz and members of the small German-organized Afrikaner Free Corps seeking sanctuary in South West Africa. English-speaking whites considered the lenient sentences disgraceful and emerging black political leaders noticed an obvious double standard when compared to the cruel handling of Zulu rebels in 1906. … Conversely, Afrikaner nationalists quickly elevated the rebels to heroic status. In August 1915, 7,000 Afrikaner women staged a march on the Union buildings in Pretoria to demand a blanket amnesty and Hertzog's National Party gained 20 new seats in the October 1915 election" (Stapleton, 2010, 116-118).

The 1915 election resulted in SAP retaining power, with Botha continuing his reign as Prime Minister until his death in 1919, Smuts succeeded Botha as interim Prime Minister (SAHO, 2009). The fallout over South Africa's participation in the First World War resulted in SAP, under Smuts, losing much of its support to Hertzog's NP which claimed the majority of seats in the 1920 election (SAHO, 2009; Stapleton, 2010). However, with the support of The Unionist Party (TUP), Smuts' SAP under this coalition was made Prime Minister (SAHO, 2009). In the following year, 1921, another election was held, fearing defeat to the NP again, SAP was forced to fuse with TUP, the latter being disbanded, shifting the controlling majority of seats and therefore paving the way for Smuts to become Prime Minister (1921-1924) (SAHO, 2009). "From 1920 onwards, until the accession of the PACT government in 1924, the authorities produced a series of measures which, though generally incorporating features that offended the integrationist and meritocratic principles of leading

Congressmen … The Native Housing Act of 1920 was a measure of this nature" (Lodge, 1983, 2-3).

In 1924, Smuts was tested under a vote of no confidence, the NP managed to force an election under a coalition between it and the South African Labour Party (LP), later to be known as the PACT government, ushering in Hertzog as Prime Minister (1924-1929) (Lodge, 1983; SAHO, 2009; Stapleton, 2010). The PACT government is argued by Worden (2012, 65) as representing "primarily white commercial farmers and local manufacturers, breaking the monopoly of mine owner interests which Smut's previous government upheld". "The Government's failure to carry the Native Representation Bill set the stage for the 1929 general election, when questions of native policy were placed before the voters as never before" (Davenport and Saunders, 311). Moreover, the PACT government could not agree on austerity measures in response to the impending Great Depression (1930-1933) and was one of the reasons for the PACT government's collapse (Worden, 2012). The NP ran and won the election, resulting in Hertzog continuing as Prime Minister (1929-1933). Under Hertzog, "Racial segregation was further entrenched and in the 1930s South Africa, like other dominions, gained more autonomy from Britain and the Cape's non-racial franchise was abolished" (Stapleton, 2010, 136).

By the 1933 election, the NP and the SAP formed a coalition enabling Hertzog to continue as Prime Minister (1933-1938), one year after the election (1934) the two coalition parties fused, to become the United South African National Party, commonly known as the United Party (UP) (Worden, 2012). "Hertzog, who clearly lacked confidence at that moment in the ability of his party to win a general election, its rural base largely destroyed by the gold standard crisis, authorised a firm approach to Smuts to be made. Smuts did not find it easy to agree to serve under Hertzog" (Davenport and Saunders, 319). Thereafter, the election of 1938, was won by the UP, Hertzog remained as Prime Minister until a year later when he was forced to resign following his neutral stance on World War II (Thompson, 2001; Stapleton, 2010). UP members then elected Smuts to return as Prime Minister (1939-1943) (Thompson, 2001; SAHO, 2009).

The 9th general election of 1943 resulted in UP retaining power, with Smuts remaining as Prime Minister (1943-1948) (Thompson, 2001; SAHO, 2009; Worden,

2012). With a campaign based on heightened segregation, the NP, under Malan (1948-1953), returned to power following the 1948 general election (Worden, 2012). Worden (2012) describes the lead up to the NP's heightened segregation campaign as follows:

> "In opposition to the government's Fagan Commission, which recognised the inevitability of permanent African urbanisation and the impracticability of enforcing the 1936 Land Act, the National Party's Sauer Report of 1946 thus recommended consolidation of the reserves, rigorous controls over African urban settlement, segregated facilities for coloured and Indians, and the abolition of the white representatives of Africans in Parliament. Coined as apartheid, this policy became the basis of Malan's campaign in the 1948 election" (Worden, 2012, 101).

The NP, under Malan, feeling emboldened by their 1948 election win and 'success' of their heightened segregation policies, went on to retain power following the 1953 election (Thompson, 2001; SAHO, 2009; Worden, 2012). Following Malan's departure in 1954, Strijdom became the 4th Prime Minister, continuing to win the 1958 election, only then to die in office the same year and be replaced by Verwoerd (1958-1961), also of the NP (Thompson, 2001; SAHO, 2009; Worden, 2012).

In sum, this Chapter has discussed climate change discourse and its three chronologically developed phases, historical (pre-17th century), early (17th-mid 20th century) and contemporary (mid 20th century-present), with particular emphasis on what important scientific and political events, such as the state sponsored scientific enquiry into heat-seeking missiles for example, resulted in these shifts between phases. Moreover, these important events were discussed whilst concurrently providing an overview of the development of the international press and their subsequent reporting of popular climate change discourse for that time. Both discussions provide a global context, which this research forms part of, and a fundamental basis on which to work from in order to later compare and contrast these global events and developments to that of this dissertations localised South African results and discussions. This fundamental basis is further established by shifting the focus from the development of to the current view of contemporary global climate change and by providing brief contextual information regarding South Africa's

weather, climate variability and climate change. In terms of political and media interactions in South Africa, it is argued that throughout South Africa's history under various political leadership used their power to profess 'free speech' as they deemed fit, and imposed their dogma through the South African media (Dawson, 2004). Media organisations that failed to conform to racialised ideology, rules, and regulations faced censorship, banning and were subsequently shut down by the state (Dawson, 2004). Marginalised groups, non-whites, and to a lesser extent white women were neglected, and excluded from media organisations, as owners, content drivers as journalists, and their views were ignored or manipulated (Cutten, 1935; de Kock, 1982; Wigston, 2001; Daniels, 2012). The exclusion of the majority of society, and the masking of the leadership failures was, according to Daniels: "particularly pressing in South Africa with its history of apartheid racism, class divisions, growing poverty, unemployment, and failures of service delivery, especially to the poor" (2012, 3). Finally, these aforementioned political and media interactions, and the discussion of contemporary South African weather, climate variability and climate change, set the overall context in which the analysis of the reporting of early climate change is undertaken. In the next chapter, Chapter 3: Methodology, the underpinning theoretical framework used for this research will be discussed followed by Chapter 4: Application of Methodologies which details how articles where selected, categorised and analysed — both Chapters being based on the literature reviewed in this Chapter and the articles analysed.

Chapter 3: Methodology

In order to achieve the aim of this dissertation a robust approach to analysing content was needed. The selection process was based primarily on answering the two research questions: (i) What is said? (subject), and (ii) How was it said? (structure). After investigating various content examination methods, three methods of content examination were found to provide the desired outcomes of this research, they are: discourse analysis, thematic content analysis and narrative analysis. The forthcoming discussion on the three methods, to be discussed in greater detail in this Chapter and their practical applicability in the next (Chapter 4: Application of Methodology), will cover thematic content analysis, discourse analysis and narrative analysis. 'Discourse analysis' has gradually become preferred to the expression 'qualitative content analysis' and similarly 'narrative analysis' is also referred to as a 'narrative approach' with each set of terms used by this dissertation interchangeably (Miller, 2003; Riessman, 2006; McQuail, 2010).

3.1 Content Analysis: The basics

For the sake of brevity, only the basics of content analysis will be further discussed. Content analysis has been used predominantly in mass communication studies and in other fields "to describe content and to test theory-derived hypotheses" (Riffe *et al*., 2005, 17). By design, content analysis sought to provide the objective, systematic and quantitative description of meaning encoded within content, emerging from the American mass communication tradition in response to qualitative methods used to analyse media content (Berelson, 1952; Williams, 2003). Campbell *et al* (2012, 461), identifies content analysis's prominence as not only due to its ability to "document specific messages that circulate in mass media", but the results thereof being used to supplement other methods of studying media effects on audiences, either in the form of experiments or survey research. Central to content analysis is the idea of signifiers existing within a whole host of other signifiers, where "it is assumed we learn to associate each signifier with a particular meaning" (Dixon, 2010, 404).

The fundamental limitations of content analysis have been well documented, and for the sake of transparency, they will be discussed. This technique does not measure the effects of media messages on the audience, nor does it allow for an evaluation of the production and representation of these messages (Campbell *et al*., 2012). Furthermore, Williams (2003) describes content analysis limitations as being rooted

in its theoretical assumptions, whereby content analysis is used as a method to simplify meaning into categories, and therefore it ignores the broader context in which meaning is being communicated. The former aspect of Campbell *et al*'s (2012) argument is rebuffed in this context as the study of media effects on audiences is argued as intangible, simply due to the temporal scale of this research (1906-1955). However, the latter aspect of Campbell *et al*'s (2012) argument is echoed by this research. In order to address this limitation, a response in the form of the utilisation of discourse analysis, thematic content analysis and narrative analysis, yet to be fully discussed, will be used. Lastly, the inherent limitation, 'theoretical assumptions', of content analysis led to it redefining and reshaping itself into various forms, such as discourse analysis and thematic content analysis, to name but only a few (see Riffe *et al*, 2005, for a greater discussion on the various forms of content analysis).

3.1.1 Thematic Content Analysis

Thematic content analysis, as the first word of this term suggests, is a form of content analysis that focuses on commonly occurring themes, phrases, and words within verbal and textual materials, and the frequency in which these commonly occurring themes, phrases and words present themselves (Hoggart *et al*., 2002; Rosenthal, 2004; Braun and Clarke, 2006). In order to implement and provide scientific verification to this research, under the theory of thematic content analysis a coding process will be conducted. Coding is argued by Secor (2010, 202) as "a systematic process, in which themes, words, phrases, and interpretations" are investigated within texts, thus coding is the practical method for the implementation of thematic content analysis theory. The subject matter under examination is that of early climate change, where each article fits these criteria, further elaborated on in Chapter 4. The coding process consists of six stages (Table 3.1.2) where the overall coding process is argued as a process that requires continuous engagement throughout the entire data collection and data analysis phases as concepts, and the codes and themes assigned are reworked, redefined, and specified (Riffe *et al*., 2005, Braun and Clarke, 2006; Goodman, 2014). Essentially, the use of thematic content analysis will answer the research question: 'What aspects of early climate change was portrayed by South African newspapers?/What is said? [subject]' (Miller, 2003; Riessman, 2006).

Table 3.1.1: Six Stage Process of Thematic Content Analysis (After Braun and Clarke, 2006 and Goodman, 2014)

Stage	Explanation
Stage 1 - Getting to know the data	Critically engage with the data in order to become familiar with the data. This step is conducted before the coding process, allowing the reader to start identifying and noting key themes and contexts on the data. If applicable, transcribing data aids in data familiarity.
Stage 2 - Generating initial codes	Occurs once the researcher is familiar with the data and initial thoughts have been noted. The codes assigned identify important features that appear to be interesting and are something that can be analysed. This stage started the organisation of the data into meaningful groups.
Stage 3 - Searching for themes	This stage entails the sorting of the list of codes and organising the data into the themes. Associations are made between the codes and themes. This is done using tables and mind-maps.
Stage 4 - Reviewing themes	It is important at this stage to revisit the themes and begin to collapse and separate the themes. It is vital to make sure the data supports the theme. This is done by first reviewing the coded extracts and rereading the data for each theme. Second, there is a need to see how applicable the themes are in relation to the rest of the data set. If the data or themes do not correlate well, rework the themes with the data till it fits. This may require recoding some of the data.
Stage 5 - Defining and naming themes	Start to define and refine the themes. i.e. describe what each theme is about and what data relates to it. How does it fit within the research? Give each theme a title or name for the report.
Stage 6 - Producing the written report	The final written report is the final analysis of the data and themes where a story is created describing the data and analysis of themes. Data is used to validate the statements made.

3.1.2 Discourse Analysis

The term ‘discourse’ in discourse analysis is an important differentiating factor when compared to content analysis (Dixon, 2010). For Scheufele (2008), for example, discourses all share four features: (i) discourses refer to popular political and social issues, such as climate change, and are therefore in a constant state of flux — internally relevant for society, or at least the majority, (ii) the elements of a discourse are a form of social interaction and wider patterns of social behaviour, (iii) discourses are argued as processes that have been constructed out of collective social reality through societal engagement and (iv) discourse can be studied by analysing media content such as texts (Fairclough, 2000; Dixon, 2010). One advantage of the discourse analysis approach is that the content, communicated message, is

separated from its producer(s), allowing the researcher to gain direct access to the content, for example, essentially bypassing the need for direct access to the producer, such as a politician or a journalist (Riffe *et al*., 2005). Moreover, as content is published, and with publications and their archives becoming increasingly digitised, content has become somewhat immortalised (Riffe *et al*., 2005; Schäfer and Schlichting, 2014). This publication immortality, in the form of archives, allows researchers to conduct large temporal scale studies, on material that has outlived its producers, their audiences, and the events described in the material (Riffe *et al*., 2005). The findings of large temporal studies can "help establish the ancestry and evolution of academic disciplines, and the points at which new theoretical directions emerge" (Riffe *et al*., 2005, 15). Furthermore, the quantification or measurement, by means of assigning coding signifiers for analysis, reduces the overwhelming information some archives possess, that would otherwise be logistically impossible if using a qualitative analysis (Riffe *et al*., 2005; Dixon, 2010). "Finally, the method is, virtually unlimited in its applicability to a variety of questions important to many disciplines in fields because of the centrality of communication in human affairs" (Riffe *et al*., 2005, 13). For these reasons, the branch of discourse analysis was selected not only for its inherent advantages, but its ability to address some of the limitation claims made by Williams (2003) on content analysis. Thus, discourse analysis fully tackles the issue of the broader context in which meaning is being communicated, especially in the South African context where historically the state professed its dogma and manifested its power through the media (Dawson, 2004; Daniels, 2012). Therefore, it is argued that discourse analysis' innate ability to illuminate patterns of variables and their relationships within texts qualitatively will enable this dissertation to critically and holistically answer the second research question: 'How was early climate change portrayed by South African newspapers?'/'How is it said?' [structure of early climate change] (Miller, 2003; Riessman, 2006).

3.1.3 The Narrative Approach

While the research questions of 'What is said (subject)' and 'How is it said (structure)' are partially answered by utilising thematic content analysis and discourse analysis, what both methods lack is the ability to provide a perspective on the changing narrative of early climate change within a changing context, the diachronic development of early climate change (Miller, 2003; Riessman, 2006). To elaborate,

both previously discussed methods do not answer the second aspect of each research question: ‘Why and how the subject changed overtime?’ and ‘Why and how the structure changed overtime?’. It is for this reason that a third content examination method was employed, after consulting literature the narrative approach was selected. As the term suggests, the narrative approach refers to how narratives of various discourses such as climate change are constructed from various viewpoints, such as individuals or governments, and how they change overtime (Miller, 2003; Riessman, 2006). While narrative analysis is primarily used in oral interviews where views, narratives, are expressed for a particular subject and changes to these views are monitored overtime under various contextual changes, it is argued that this approach can also be used for uncovering changing views in historical texts and newspaper articles in particular (Miller, 2003; Riessman, 2006). Riessman (2006, 186) argues that “Narratives are storied ways of knowing and communicating” and that what makes texts such as newspaper articles ‘narrative’ “is sequence and consequence: events are selected, organised, connected and evaluated as meaningful for a particular audience”. Hence, the narrative approach can be considered both a research method in itself as it can identify changes in newspaper narratives on early climate change overtime and is also the phenomenon under study, newspaper narratives of early climate change. Essentially the narrative approach identifies what influencing narratives, either scientific or political for example, resulted in the development of and changes in the use of thematic content (subject — for example: terms and phrases developing and their meaning changing overtime such as ‘global warming’) and in the use of discourse (structure — for example: what narratives resulted in changes in how content was framed by the media).

In summary, it has been argued that by utilising thematic content analysis, conducting a coding process, discourse analysis and narrative analysis in unison they each would alleviate the other’s inherent limitations, and most importantly the use of these three methods creates a robust methodological framework which theoretically answers the research questions set out in a critical and holistic manner. The practical methodology of applying this robust methodological framework is discussed in more practical detail in Chapter 4.

Chapter 4: Application of Methodology

As previously mentioned, the portrayal of early climate change by the media under investigation is that of English South African newspapers, pertaining to the South African Weather Service's (SAWS) archive of clipped newspaper articles for the period 1906-1955 (50 years). The newspapers represented in the archive are a mixture of regional and national as well as daily and weekly newspapers. The following discussion will provide insight in the composition of the SAWS' archive, its advantages and limitations, Section 4.1, and importantly a practical walkthrough on how articles have been analysed for this research, Section 4.2.

4.1 Secondary Data

The background and reason for the archives creation is not fully known, other than it started in 1905 with a single article and thereafter was consistently populated by more weather and climate related articles over the years. Later, the archive would be categorised thematically under weather and climate related themes such as lightning, drought and ozone. The SAWS archive is a nonprobability sample, more specifically the archive is referred to as a 'convenience sample' by Riffe *et al* (2005). A convenience sample, is a sample that is populated by availability rather than by research questions, as the content was collected by several SAWS librarians over the years and not by a researcher (Riffe *et al*., 2005). Hence, convenience samples have obvious limitations as the population of the archive, the article selection process by the librarians, are bias representations (Riffe *et al*., 2005). Moreover, the use of the archive, unlike probability samples, infers that the use of statistical inference is unfeasible (Riffe *et al*., 2005). The use of a convenience sample is justifiable due to three reasons: (1) replicating a sample of this magnitude is unachievable as alternative newspaper archives either do not exist or cannot match the SAWS archive's temporal scale, and volume of content, (2) the availability of limited resources such as, time and funding, and (3) little is known on the research topic in a South African context and to an extent an international context — especially for historical and early climate change reporting (Riffe *et al*., 2005; Boykoff, 2011; Painter, 2013).

While conducting an initial review of the archive, to identify what research frameworks and parameters were plausible and achievable, issues arose with regard to early climate change, specifically with the terminology used. Climate change

discourse and its terminology has evolved concurrently with climate change science, technological advancements as a result of an increase in climate change research. Many of the terms that are used today in contemporary climate change, popularised by the scientific, political and media spheres of our society, such as, the ‘greenhouse effect’, ‘climate change’, and ‘global warming’, were only introduced in the last few decades (Boykoff and Boykoff, 2007; Anderegg and Goldsmith, 2014). Hence, this terminology did not exist in the first half of the 20th century. Accordingly, internal knowledge of contemporary climate change was used to identify whether an article was reporting on what we today might call ‘climate change’. Moreover, the use of scan-type reading of the headings and subheadings, as used by researchers such as Carvalho and Burgess (2005), for example, in their research on contemporary climate change reporting, was not very effective in identifying articles with early climate change as their core theme, other than articles that were explicitly titled, such as “Effects of Trees on Climate” (Unknown, *The Star*, 24 July 1934). To address this limitation, only articles that discussed early climate change as their core theme, reflected in their headline, introduction, sub-headline(s), and that form the basis of the argument made/issue raised by the author, was considered for further analysis. Thus, articles that focused on other related environmental issues, such as water pollution or food security — essentially articles that only make a brief reference to climate change were not considered (Tagbo, 2010).

An additional limitation of the archive includes the inability to identify how many climate change articles are published within each publication as a whole. According to Carvalho and Burgess (2005, 1461), “The volume of press coverage provides an important indication of the attention given to an issue over time”. Nevertheless, the aim, research questions and methods proposed here and continuing into the next subsections still allow for the analysis and measurement of climate change articles overtime. The use of the SAWS archive allows a greater analysis on the diachronic development of the media's representation of early climate change in South Africa, and what drivers led to this development. Thus, the attributes of convenience samples play a pivotal role in the development of research and analysis, whereby a sampling frame is difficult to create/reproduce when the diachronic relationships have yet to be tested adequately (Riffe *et al*., 2005; St Martin and Pavlovskaya, 2010).

4.1.1 Validity Testing

As previously discussed, the limitations of this research are linked to the SAWS archive itself. In order to address and assess the extent of the SAWS archive's said limitations, a validity test has been conducted to assess the gaps in newspaper article collection. Before continuing it must be stated that important historical events such as the World Wars could also have played a role in gaps developing in the archive. On the one hand, physical archives of print media are available but differ in geography which would place limitations on any researcher, funding and time constraints, and the use thereof would only provide a singular newspaper narrative on a particular topic. Digital archives of print media, on the other hand, are relatively easy to obtain for the purpose of validity testing, however, the establishment and the population of South African print media in prominent digital archives is limited. Upon further investigation for a more robust South African digital archive, only one digital archive matched with the temporal selection of the SAWS archive (1906-1955) under investigation, Readex's *The Rand Daily Mail* (1902-1985) archive, the website cached by internet search engines in November 2017. Hence, only one newspaper could be tested, *The Rand Daily Mail*.

In order to assess the SAWS archive's representation of articles which were selected and archived by various librarians throughout the years, a validity test was undertaken. As previously discussed, only Readex's *The Rand Daily Mail* archive matched the SAWS archive's temporal scale and as a digital archive was easily accessible, which is why it was used to cross reference *The Rand Daily Mail* articles analysed from the SAWS archive. An early climate change keyword, that was present and popularised by 6 articles that were analysed was used. Of the 714 article matches, only 42 articles covered early climate change, the 6 articles from the SAWS archive also formed part of these 42 articles. Therefore, the SAWS archive represented 14.3% of *The Rand Daily Mail*'s articles, based solely on this one keyword. While this representation percentage might seem at first sight and thought as insignificant and a deterrent from utilising the SAWS' archive, it is argued that without engaging with the SAWS archive first, keywords such as 'Kalahari scheme' which are derived from analysing the content covered would not have been known. More likely if the Readex archive was used only contemporary terms such as 'climate', 'climate change' or 'solar variability' would have been used, further skewing findings on early climate change to lower numbers, due to climate change

researchers being shortsighted or biased by their content knowledge of climate change, contemporary rather than early. Furthermore, it is argued, in further detail throughout the next chapter, that as the validity results only pertain to one newspaper, *The Rand Daily Mail*, these results cannot be argued to be a full reflection for the other newspapers analysed. Hence, the undertaking of this research is still argued to have provided invaluable insight into early South African newspaper reporting of climate change, to be justified in the succeeding Chapters.

4.2 Data Analysis

After firstly engaging with the SAWS archive in Pretoria, gaining permission from SAWS and its librarians, to review the types of articles and newspapers contained therein, a second archive was created. The second archive was comprised of scanned articles from the SAWS archive that met the research's criteria, essentially articles with climate change discourse as their core theme, 'other' articles were not measured — accounting for a combined total of 39 articles from eight newspapers.

The data analysis phase is fundamentally influenced by the methodological theories previously discussed, Chapter 3: Methodology, that create a robust framework which adheres to the aim and research questions set by this research, ultimately fostering a holistic interpretation of the data diachronically. In order to make use of discourse analysis, which is used to illuminate patterns of variables and their relationships in texts, and in their external context, and thematic content analysis, to identify and categorise themes, phrases, and words, and their frequency of publication it was decided that both should be combined into a coding sheet comprised of key parameters in the form of coding questions for gathering information. The use of a coding sheet was inspired by Painter's (2013) use of a coding sheet, which is underpinned by discourse and thematic analysis. Painter (2013) structured and made use of a coding sheet when they researched how contemporary climate change was framed and encoded by various IPCC reports then decoded and re-encoded by the the media, Australian, French, Indian, Norwegian, British and American, specifically the media's use of the frames of risk and uncertainly, amongst others, in their reports of contemporary climate change.

In accordance to the previously discussed methodological framework, Chapter 3, and in order to assess the viability of utilising Painter's (2013) coding sheet the 39 articles

where continuously assessed and reassessed in order to find applicable discourses and themes, which in turn would aid in creating a new coding sheet, see Appendix 1. Certain aspects of Painter's (2013) methodology, their coding sheet, did conflict when analysing the articles, for example the coding sheet lacked a developing country versus a developed country frame — whereby contemporary climate change is argued by developing countries, politicians therefrom to be more specific, to be a developed country's issue as they would pollute more GHGs and therefore should be more responsible for curbing anthropogenically induced climate change by means of mitigation and adaptation initiatives. Nevertheless, overall Painter's (2013) structure and especially the frames of risk and uncertainly in their coding sheet remained particularly useful, with a majority of Painter's (2013) coding sheet being reintegrated into the new coding sheet used by this dissertation for analysis, see Appendix 1. Certain reintegrated aspects of Painter's (2013) coding sheet were reworded and/or rephrased to be more appropriate and applicable to early climate change articles. For example, question 10.2.1 of the coding sheet (Appendix 1) was changed from Painter's (2013) original coding sheet question of "Did the article mention the shortcomings of computer models" to statistically based projections. Overall, the greatest differentiating aspects between the original coding sheet used by Painter (2013) and the one used for this dissertation was the exclusion of the coding questions specific to the IPCC and its concepts of likelihood and confidence and specific coding questions used by Painter in their study of arctic sea ice melt reporting. Alternatively, the greatest differentiating aspects where new coding aspects were designed and implemented into creating the coding sheet used by this dissertation included: (i) an article's textual and contextual issues, (ii) social actors, (iii) identifying the climate change discourse facet, overarching terminology and underlying process(es) (iv) the introduction of an opportunity frame, (v) the introduction of an adaptation and mitigation initiatives frame, (vi) the introduction of a developing versus developed frame, previously discussed and (vii) coding questions used to analyse any accompanying graphics within the articles. The reason and/or influencing research which lead to new coding questions being designed and/or incorporated will be elaborated on whilst concurrently describing the practical steps in the coming paragraph.

Each of the 39 articles underwent a total of 57 coding questions to ascertain the the subject covered and structure of early climate change articles. The following numbers

in brackets correspond to the coding question number used on the coding sheet. First and foremost essential article information was collected: (1) name of the newspaper, (2) title of article, (3) publication date and (4) author(s), based on the newspaper and its article's textual and contextual issues (Carvalho and Burgess, 2005; Painter, 2013; Schäfer *et al*., 2014). To unpack the textual and contextual issues identified by Carvalho and Burgess (2005), on a textual level: morphological characteristics (related to the form, position and size of the article within a newspaper); structural organisation of texts (the chosen headline and the first few paragraphs); objects (themes) and social actors represented in the text (politicians for example); linguistic and rhetorical issues (lexical choices, metaphors, and other figures of speech); discursive strategies (strategies of discursive "manipulation" of reality in order to achieve a certain goal or effect); and, ideological standpoints (editorial positions on discourses for example) (Carvalho and Burgess, 2005; Schäfer *et al*., 2014). However, the practical analysis of morphological characteristics could not be studied, as the articles were clipped out and pasted into a blank book. Therefore, the contextual analysis used addressed two issues: "comparative-synchronic (simultaneous depictions of the issue in different newspapers), and historical-diachronic (temporal sequences and evolutions)" (Carvalho and Burgess, 2005, 1461). It must be noted that due to a lack of author identification, from hereon, in the results and discussion, and conclusion chapters of this dissertation, 'author', 'journalist', and 'writer' will be used to signify the different types of authors of the early climate change articles under further analysis and discussion. What differentiates the usage of these essentially similar nouns from one another in this dissertation is that 'author' will be used when describing the authors of all the articles under further analysis and discussion, an overarching term which includes 'journalists' and 'writers'. 'Journalist' will be chiefly used where it is most likely that an accredited journalist was the author of the article under discussion, such as a news report, editorial, and feature. While the term 'writer' will be exclusively used for an author of an opinion and column piece, and letters as the background of the authors of these aforementioned article types are unknown and therefore have the potential to be any member of the wider public. Finally, it must be noted that unless otherwise appropriately deemed, and argued for, 'author' will again be used for the authors of articles that are outside of the preselected and defined article types — the 'other' category. The underpinning reason for this decision will be discussed in greater detail

in the preceding results and discussion chapter, Subsection 5.1.1 *The Star*: Article Type.

Thereafter, articles were categorised according to article type (5), either as one of the following: (a) news report, general report of an event that is new, (b) editorial, (c) feature, not a new event, which allows an author to explore the topic in more detail, (d) column or opinion piece, (e) letter or as a (f) 'other' form of article (Painter, 2013). Finding a lack of applicable coding questions pertaining to the research question of what subject was covered, in regard to early climate change, by other reviewed research a set of new coding questions was designed. Climate change discourse as a subject is argued to be comprised of three levels: the first being the facet (6), followed by the overarching terminology (7) and the last being the underlying dominant process(es) (8). The facet (6) could be either natural, anthropogenic, both or where no clear distinction between the former two was covered. The overarching terminology (7) could be climate change in general or solar variability and the underlying dominant climate change process(es) (8) covered could be a decrease in rainfall, increase in temperature and so on. After categorising articles according to subject (6-8), each article's source(s) referenced (9) was categorised to identify what social actors, such as scientists, politicians, nongovernmental organisations (NGOs) and so forth played a role in the publication of the article (Carvalho and Burgess, 2005). The categorisation of sources was according to type and geographical origin (9), the origin became an increasingly important variable to measure as a pattern of almost solely international sources were used — to be discussed fully in the succeeding chapter. The type of source categories are: (a) scientist(s), (b) expert(s), (c) scientific report(s), (d) institution(s), (e) ordinary citizens, (f) publications, (g) unsourced as a whole or (h) 'other' (Liu *et al*., 2008; Painter, 2013). To expand on 'scientist' as a source category, scientist is chiefly used when the source in question is a scientist/social scientist who directly works towards the establishment and advancement of climate change science and technology, examples include meteorologists, climatologists, sustainable development researchers and so forth. Alternatively an 'expert' is used to categorise other social actors who indirectly work towards the establishment and advancement of climate change science and technology, examples include especially governmental social actors such as politicians as well as climate activists among others. Moreover, 'scientist' will be used if the researcher referenced is verbally speaking to the press about their latest

research based on the establishment and advancement of climate change science and technology. For example, a botanist that researches orchid habitats is an expert, until they research the impacts of climate change on orchids and/or their habitats and this new research is the prime reason for media attention then the botanist would be categorised as a scientist rather than as an expert. For the categories scientific report(s) and institution(s) they are as their names suggest, publication(s) refers to an expert's published report/book, while the ordinary citizen(s) category is used for individuals that are not directly or indirectly working towards the establishment and advancement of climate change science and technology such as sailors, veterinarians or web developers.

Coding questions 10-15, including their respective subquestions, are asked to assess an article's frame, the structure of early climate change articles starting with the uncertainty frame (10) followed by risk (11), opportunity (12), adaptation and mitigation (13), developing versus developed (14) and lastly the overall dominant frame (15), the latter is primarily based on the results of all previous frame questions 10-14 (Painter, 2013). The development of the uncertainty frame is as a "result from [a] lack of information or disagreement over what is known or even knowable" in terms of climate change science consensus and therein it's reporting by the media (Painter, 2013, 11). For example, as previously discussed in Chapter 2, uncertainty exists surrounding various questions, such as 'what impact would an increase in anthropogenically induced climate change have on desertification rates'? Moreover, should the uncertainty frame not exist the its opposite would be true — the certainty frame would exist as there would be no uncertainty on the early climate change science and therein it's reporting by the media.

The risk frame is closely related to the uncertainty frame as uncertainty surrounding aspects of climate change science such as not knowing definitely the impacts of climate change results in risk emanating from not knowing. Furthermore, the risk frame is used by scientists to convey both the risks of not fully understanding the lesser known definite impacts climate change can have on the planet but also on the greater known impacts climate change can have which could impact globally and have catastrophic consequences that result in a greater push for action and garner further media, political and societal attention (Painter, 2013). For example, the lesser known definite impact climate change has and would have on ENSO intensities and

the greater known climate change impact on sea level rise are considered risks and as such are encoded, written and spoken about, under the risk frame (Painter, 2013). Moreover, the use of the risk frame can also be separated into two branches, either implicit or explicit risk, of which both branches' definitions differ slightly from Painter's (2013) due to contextual and temporal changes. Implicit risk, risk that is implied, for example in a headline includes 'South Africa could be drying up', while explicit risk refers to explicit adverse impacts resulting from climate change being reported on, such as 'Millions at risk of starvation as South Africa dries up'.

The opportunity frame is based on the continuing with business as usual scenario, whereby a continuation of an increase in anthropogenically induced climate change is left unchecked (IPCC, 2013, 2014a and 2014b; Painter, 2013). Furthermore, the opportunity frame is primarily structured on the work of climate deniers and sceptics when they write or verbally express climate change discourse and in some cases they are sponsored by polluting corporates such as oil companies (Oreskes and Conway, 2010; Klein, 2014). In essence this frame's emergence and use is as a result of climate change action through an increase in scientific enquiry, mitigation and adaptation measures being pinned against capitalism (Oreskes and Conway, 2010; Klein, 2014). Opportunity framed examples include corporate sponsored climate deniers/politicians from Canada arguing that an increase in global land surface temperature would decrease permafrost and seasonal snow cover and would in turn result in an increase in more arable land being available and grant easier access to oil/gas fields, to increase economic growth and lead to job creation (see Oreskes and Conway, 2010 and Klein, 2014 for in depth discussions on how corporate sponsored climate deniers and politicians make use of the opportunity frame and how climate change action is pinned against capitalism). The alternative of the opportunity frame is that of the adaption and mitigations initiatives frame, opportunities which arise from transitioning to renewable energy, a green economy or incorporating a carbon tax for example — based on climate change adaptation and mitigation initiatives (IPCC, 2013, 2014a and 2014b; Painter, 2013). Next is the developed versus developing frame, previously discussed, followed by the overall dominant frame of the article, which is based on the results of the previous frames and which accounts for articles containing multiple frames throughout (Painter, 2013). For example, an early climate change article could begin with an uncertainty framed headline, such as 'Is South Africa drying up?', which continues throughout until the

conclusion paragraph which contains the adaptation and mitigation initiatives frame by writing about afforestation. Ultimately, the dominant frame is as the name suggests the dominant frame used throughout each article.

Following the analysis of frames used by the articles, direct quotes (16), linguistic repertoire (17), general tone/tenor (18) and mainstream consensus and sceptical voices (19) and their internal framings were analysed — all of which collectively answers the research question of how early climate change articles were structured (Painter, 2013). Lastly, any accompanying graphics, such as photographs, diagrams and illustrations, were analysed (20) using the same frameworks set out in Chapter 3, discourse and thematic content analysis combined with the structure of the coding questions used created a 'visual analysis' approach. The reason for analysing the accompanying graphics was to identify what types of graphics were used and what meaning(s) they were evoking to the reader, as the use of graphics in articles are argued to have a detectable impact on reader interpretation of climate change (Boykoff, 2011; Painter, 2013). For example, a rainfall graph showing a progressive decrease over 100 years can aid in the reader's understanding of the methodological and scientific results behind climate change discourse, while a picture of coastal erosion could be used to illustrate the risk of a rise in sea level caused by climate change (Boykoff, 2011; Painter, 2013).

In sum, this dissertation's aim and research questions were designed with the SAWS' archive, including its advantages and limitations, in mind and to provide the best possible insight into what and how early climate change was reported — the subject and structure and subsequently how the subject and structure changed overtime. The combination of discourse and thematic analysis into a coding sheet allows the first aspects of the research questions set to be answered on the subject and structure of the reporting of early climate change. However, it must be stated that the use of a coding process, coding sheet, opens this research to criticism. This is due to issues surrounding statistical inference with the use of the SAWS archive, a convenience sample, which is argued by Riffe *et al* (2005) as unachievable and problematic, as previously discussed. Understandably the issues brought forth in Riffe *et al*'s (2005) arguments are valid and have been taken into consideration, however, there is still an argued benefit in the undertaking of a coding process. The use of the redefined coding process added three dimensions to this research which otherwise would not

have existed: (i) the coding process allowed the amount of research to be condensed, not diluted, into a manageable workable sample, (ii) the addition of research reliability can be attained and more so it can be used for future research, and lastly (iii) building on the previous point, the use of a coding process, aside from the discussion and conclusion of results, adds an additional layer of reflectivity whereby ideological bias cannot be implicated (Riffe *et al*., 2005). Furthermore, the inclusion of a narrative approach, covered in Chapter 3: Methodology, is used to analyse how and why the subject and structure of early climate change articles changed chronologically. As a narrative approach is a research method in itself it is also the phenomenon under study which is why the succeeding chapter, Chapter 5, the results and discussion of this dissertation are combined and presented in a symbiotic-like manner.

Chapter 5: Results and Discussion

Due to the robust methodological framework and practical application detailed previously, this Chapter is a combination of the results and discussion. Thematically, in this Chapter begins with article type (5.1), article sources (5.2), subject matter (5.3), framing (5.4), quotes and indicators of mainstream consensus versus sceptical voices (5.5), linguistic repertoire and general tone (5.6) and accompanying graphics (5.7).

5.1 Article Type

A total of 39 articles covering early climate change was analysed from the SAWS archive, in descending order the newspapers with the most articles was: *The Star* (17), *The Sunday Times* (7), *The Rand Daily Mail* (6), *The Pretoria News* (3), *The Graaff-Reinet Advertiser* (2), *The Daily Dispatch* (2), The Cape Argus (1) and *The Northern News* (1). Problematically, 27 articles were written by an unacknowledged author or authors, in some cases the only thread of identification that exists are in the form of generalised comments such as: 'from our own correspondent or representative in or from area X'. A lack of author identification results in no evidence to support a conclusive answer on the following three sequential and fundamental questions: (i) were all 27 articles written by a single author or multiple authors, (ii) were they an accredited journalist or a member of the public, what essentially was their background, could they have been a specialty journalist or have had scientific or meteorological knowledge, and (iii) were the authors employed directly *by* the newspaper in question *or* were they independent journalists or freelance writers? In order to address the aforementioned plurality and identification issues from hereon when discussing the author or authors of an article, as the possibility exists for both to be equally true, they will rather be expressed as singular — author, unless stipulated that the article was co-authored or when discussing multiple articles, authors will be used. Furthermore, a lack of author identification bars the analysis and therefore the ability to establish an understanding on the following three crucial aspects: (i) whether a dominant author existed that wrote all, or most of, the articles on early climate change, and equally important, for what period of time were they the dominant author, (ii) the ability to track and trace whether an author changed their narrative position overtime and subsequently what were the underpinning reasons, if evidence exists to suggest such a change, and lastly (iii) whether articles that were published as a series were written by a single author or multiple authors over the

entire duration of the published series of articles or whether articles in the series were written by revolving authors, possibly, with different positions on early climate change.

Authors that acknowledged themselves or who where acknowledged by the newspapers for the remaining 12 articles are: Prof. E.H.L Schwarz (a letter, 26 August 1922, and an opinion or column piece, After 25 April 1925), Dr. T.E.W. Schumann, the Chief Meteorologist of South Africa at that time (a letter, 23 November 1933), Mr. Tom Moore of Church Street, Pretoria, (a letter, 16 October 1933), 'C.L.K' (a letter, 17 October 1933), C.A. Dawson (BSc. Agri) (four weekly opinion or column pieces as part of two series, all published in 1934, 19 August-9 September), C. Moore (two weekly opinion or column pieces as part of a series, 11 and 18 August 1935) and lastly an opinion or column piece by a 'farmer reader' A.G. Erlank (10 January 1949). Furthermore, Prof. Schwarz and Dr. Schumann play integral roles in the chronological development of early climate change narratives and in shaping early climate change consensuses, both scientific and public, which will be discussed in more detail throughout this Chapter. Moreover, C.A Dawson and C. Moore's series also played a vital role as they are the only authors to write a series of articles elaborating on the scientifically and publicly held consensuses of that time on early climate change, also to be discussed in more detail throughout this Chapter. In sum, three authors, Prof. Schwarz, Dr. Schumann and C.A. Dawson, were scientists with the remaining authors, C. Moore, Tom Moore and A.G. Erlank, being ordinary citizens, which indicates that members of both the South Africa scientific community and general public were involved in the development of early climate change narratives.

Moving from the topic of author identification to article type, of the 39 articles the majority of the articles (14) were features, followed closely by opinion and column pieces (13), news reports (5), letters (4) and 'other' article types (3) (Figure 5.1). These results for the SAWS archive suggests that journalists (features, news reports and 'other' article types) and to a lesser extent individuals (opinion or column pieces and letters), scientists, experts and ordinary citizens, were the main drivers of early climate change. Furthermore, the use of features as the dominant article type, rather than news reports for example, highlights that journalists took their time in writing about early climate change which allowed them to consult with scientists and experts,

who in turn provided a ‘layman's’ summary on the topic under discussion. This is evident in two parts: (i) in journalists removing a vast portion of scientific jargon, which includes methodologies, terminologies and mathematical equations among others, from articles and (ii) in the usage of scientists and experts as the main source pools. The second point is discussed in more detail in the next Subsection.

Interestingly, all three of the articles that fell in the ‘other’ category, two published in 1926 and the third in 1935, were the authors themselves responding to a number of readers’ questions and comments on previous feature articles written. For this reason, it is most likely that a journalist was responsible for writing these three ‘reflection pieces’. For example, in one of the reflection pieces titled “The Weather”, published in 1926, the journalist defended their narrative position that the view expressed by a local authority figure on the recent heat wave over the Transvaal as being “… nothing really abnormal…” was groundless and that “The best comment on this rather surprising statement was the December weather record, [which was published after the initial feature article was written] which showed that last month was the hottest December experienced in Johannesburg for the past 22 years” (Unknown, *The Star*, 7 January 1926). The journalist continues to supplement their view that the heat wave was abnormal by incorporating unsourced reports on sunspots, and by writing on behalf of citizens that experienced the heatwave first hand, and goes on to write that: “Those who have sweltered and suffered through the past three weeks will not split straws over the proper word to use; for the choice they would probably ask for something much more emphatic that is usual in meteorological language” (Unknown, *The Star*, 7 January 1926). In the second half of the same article the journalist also defends their view that global weather could be interlinked by providing the following statements:

> “The storms and floods in Europe at the same time may be merely a matter of coincidence. **As we have pointed out before**, it would be idle for anyone either to affirm or deny that there is any connection between such things in different parts of the world because, even after some remarkable advances during the past decade or two, science is still groping as regards the underlying conditions which make for weather changes up the earth at large” (Unknown, *The Star*, 7 January 1926).

The journalist then continues their defence by providing a fuller overview on sunspot research, and thereafter writes about theories based on the possibility that sunspot activity could be the cause of the heatwave experienced, before concluding the article with another overview but this time on the advancements made in the meteorological field (Unknown, *The Star*, 7 January 1926).

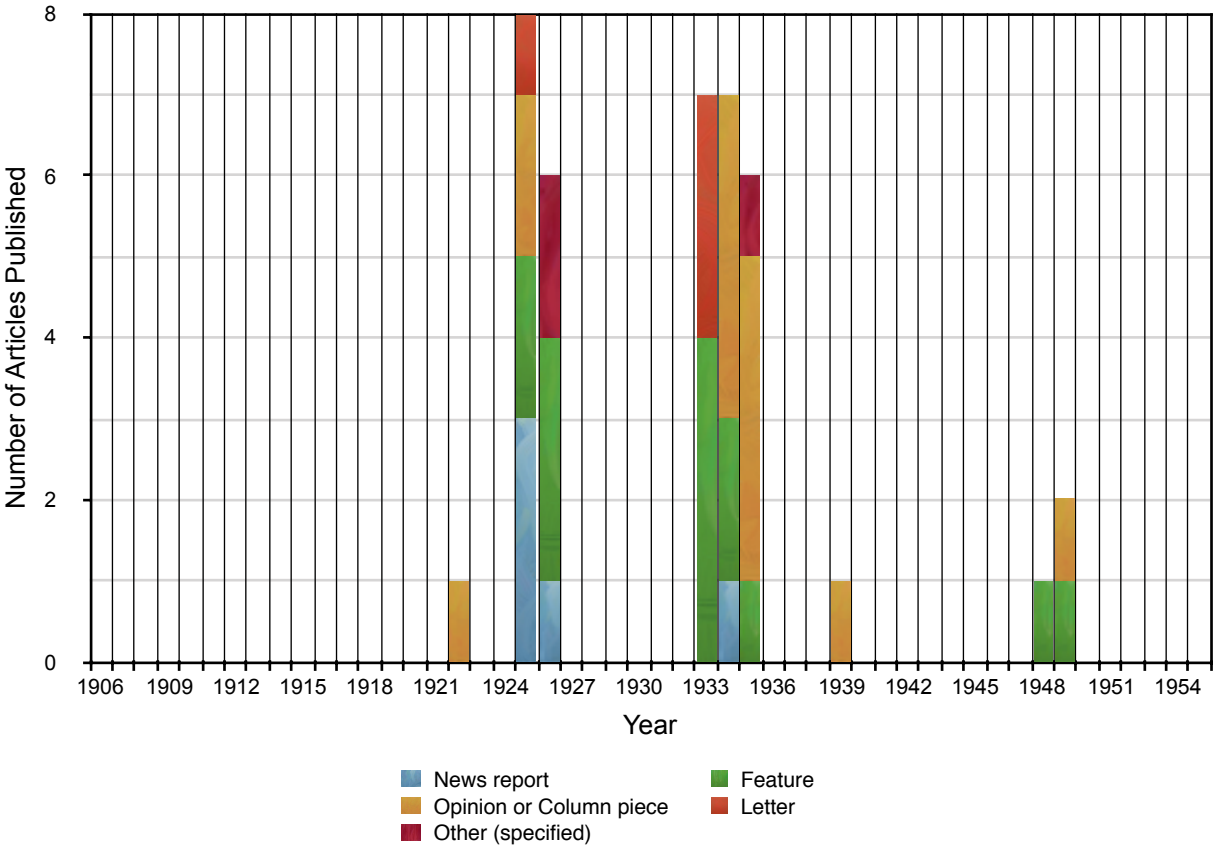


Figure 5.1: Article Type

5.2 Article Sources

For the articles analysed, of the total of 125 sources the dominant article source referenced is that of scientist (53) followed by expert (22) (Figure 5.2). The reasons and factors as to why other source categories remained relatively underutilised, institution (18), scientific report (15), ordinary citizen (13), publication (3) and one unknown source, will be expanded further by investigating not why these categories were used less, but rather why the scientist(s) and expert(s) source categories were used more (Figure 5.2). The reason for the scientist(s) and expert(s) source categories dominating the period of 1906-1955 are simplistic in their nature; scientists have the knowledge and skills to produce meteorological science and technological advancements, and thus have the capacity to comment on the topic,

while experts such as politicians, governance and policy experts, are also stakeholders in the research, development, and advancement of meteorological science and technology, making both a prime source pool. To expand on the latter by means of an example; politicians have negotiating clout in the establishment, upkeep and direction of national weather bureaus, who's weather forecasts are further used by other governmental departments, such as agriculture, water, defence and so forth, to inform policy and practical decisions which could have vast impacts on an array of sectors and fields, and ultimately society at large. In addition to the aforementioned reasons, one must also further understand the embedded symbolism in utilising scientists and experts as a prime source pool by media outlets. Unlike institutions, scientific reports, publications and ordinary citizens, the former two of which could be argued in some cases to be more factually rich than statements made by a scientist or expert, the differentiating factor is that scientists and experts are in essence individuals. As individuals, the media is not only able to place a name and a face, in some cases, making it easier for their audience to visualise and understand that they have standing in the matter at hand, but to also hold them accountable for what they said or did. More importantly on symbolism, individuals may in some instances be seen as representing something more than just themselves. Delaney (2008, 307) argues that there are certain people that "… become cultural icons because they epitomize personal attributes and qualities that are culturally valued". Former South African President Nelson Mandela, for example, is seen as a symbol of the abolishment of apartheid and for the ANC, hence politicians can represent a national view, and/or a national governmental consensus, and/or their political party view on a particular issue and/or topic. Hence, scientists and experts can represent highly regarded institutions or political parties and as individuals they are more approachable and garner more attention from authors and readers alike, especially politicians or highly regarded and distinguished scientists, at that time, such as Jan Smuts, Pres. Theodore Roosevelt or the Head of SAWS, Dr. T.E.W Schumann. To elaborate on the former examples, a news report titled "Huge Afforestation Plan in America", and as the title suggests was on an ambitious mass scale afforestation project with "… its [objective] being to modify climatic conditions right through the States" (Unknown, The Star, 23 July 1934). The following extract provides greater insight into the ideology behind, and the methodology proposed for the afforestation project:

> “Designed to combat the growing tendency to chronic drought which threatens the existence of the agricultural communities in the Middle West, the project involves the planting of an immense forest belt running north and south from the Canadian border to the Texas ‘panhandle.’ The dual purpose of the belt is to break the wind and conserve the moisture in the soil. It will be a hundred miles wide and a thousand miles long, and the intention is to plant the trees in a hundred parallel strips a mile apart, leaving the land between in cultivation” (Unknown, The Star, 23 July 1934).

The afforestation project was estimated to require three and a half billion trees, and was championed by Mr. H.A. Wallace (Secretary of Agriculture, USA) and approved, in part with 20% of the project’s budget allotted by President Roosevelt (Unknown, The Star, 23 July 1934). In the same article the journalist concluded it by writing a separate section titled ’Union’s Own Grave Problem’, where General Smuts’ speech to parliament, on the 4th of May, on the importance of implementing new water and soil security policies was quoted (Unknown, The Star, 23 July 1934). The following is an extract of Smuts’ core arguments:

> “Years ago one of the great Presidents of America, Theodore Roosevelt, suggested the policy of conserving the natural resources of his country. It was calculated then that in the United States 10,000,000 morgen of land which could be cultivated was annually washed down to the sea. We have no comparative figures for South Africa. We would like to see the Roosevelt policy carried out in South Africa on an even bigger and more suitable scale. In our country the mountainous parts along the coast ought to be one of the largest gardening areas on earth. It ought to be a fruit garden from one end to the other. Yet we allow the land to wash away and destroy the water sources by the policy we are following to-day. I believe it is still possible to repair much of the harm, but we shall have to act quickly and on a big scale. It may not be popular what we have to do, but we shall have to go to the root of the matter and to see that the sources of our water are protected. We shall not be able to allow private property and prejudice and misconceptions about science, to stand in our way in this respect, but we shall have to see that South Africa is organised on a fixed

> basis in order to protect its water supplies. We cannot go on as we have done in the past" (Unknown, The Star, 23 July 1934).

Unlike the first half of the article where 'climate change', a change in the USA's climate becoming drier, was the direct underlying cause for political action in the form of the afforestation project mentioned, Smuts does not directly mention 'climate change', even though a trend for a drier South African climate was popularised in previous articles, starting in 1922, still to be discussed, as the underlying cause as to why water and soil security was to be taken seriously.

In 1934, a feature published one day after "Huge Afforestation Plan in America", titled "Effects of Trees on Climate", included further information on the USA's afforestation project, the effect of trees on rainfall, and an interview, which was conducted with Dr. Schumann. Dr. Schumann, Chief Meteorologist of the Union at the time, was asked about his views on the USA's afforestation plans, and his response to Smuts' comments in another article where Smuts argued that South Africa needs greater water and soil security, to which Dr. Schumann responded:

> "I agree with General Smuts, where he states that South Africa is a land of wanting assets, not only as regards its mineral wealth, but especially as regards the fertility and usefulness of its soil. If the reports in the papers are correct, America is embarking upon one of the greatest experiments ever attempted by man. In a series of articles about a year ago I advocated a similar ambitions afforestation scheme for this country in order to improve the climate and the water supply [this article was not found in the archive]. In view of the warning uttered by General Smuts last year, in one of the most remarkable speeches he has ever made in Parliament, and in view of this American project, the moment might be opportune to give serious consideration to a general campaign for afforestation throughout South Africa" (Unknown, The Star, 24 July 1934).

These two articles are prime examples of why the scientist(s) and expert(s) source categories dominated, due to politicians, two heads of state, garnering the media's attention for discussing national early climate change strategies and the subsequent

expansion on the science behind those strategies by Dr. Schumann (Unknown, The Star, 23 July 1934; Unknown, The Star, 24 July 1934).

Moreover, scientists are not only dependent on the credibility of their research, but on the representation or message it gives out to a wider audience, not only that of academic journals and conferences (Beckers *et al*., 2007; Jutro, 2007; Weingart, 2007). The message can be distorted, ignored or published with minor edits by the media (Beckers *et al*., 2007; Jutro, 2007; Weingart, 2007). Weingart (2007) argues that exaggerated, contested, and unfounded scientific pronouncements, possibly due to scientists avoiding trite pronouncements that end up not being picked up by the media, can result in a loss of credibility for scientists. For politicians, a loss of legitimacy can ensue if the the public and/or media is skeptical of their approach to scientific pronouncements (Weingart, 2007). Lastly, if a scientific pronouncement is not picked up by the media, contradicting aspects of popular scientific and/or social and/or political discourses, a loss of attention and market share can result (Weingart, 2007). Thus, the media, societal, scientific and political spheres are interconnected and can influence one another (Weingart, 2007). In sum, for reasons discussed, individuals, especially scientists (53) and experts (22) and extending somewhat to ordinary citizens (13), are capable of attracting more media attention than institutions (18), scientific reports (15) and publications (3) during this time period, as they represent more than just their own individualistic views and beliefs, and that those views and beliefs can result in policy changes and/or practical implementations that could impact society (Figure 5.2). These potential impacts are fundamentally in the public's interest, and therefore it is in the interest of the media to consult scientists and experts as a prime source pool.

Two articles, titled "Advance of the Desert" (Schwartz and Unknown, *The Cape Argus*, 26 August 1922) and "Correspondence" (Schwartz, *The Northern News*, After 25 April, 1925) made no reference to any sources and another article made use of an unknown source, "The 1924 Rainfall" (Unknown, *The Daily Dispatch*, 6 January 1925). Both "Advance of the Desert" and "Correspondence", the former also being the first article found to discuss early climate change, was written by Prof. Schwarz, hence the article had no source as the professor acted as both source and author (Schwarz and Unknown, *The Cape Argus*, 26 August 1922; Schwartz, *The Northern News*, After 25 April, 1925). For "The 1924 Rainfall", the focus of the article and its

author is a graph, which is also supplied in the article, from an unknown source, showing the 40 year (1884-1924) monthly average rainfall for East London (Figure 5.5.3.1) (Unknown, *The Daily Dispatch*, 6 January 1925). The author does not directly focus on the climate change implications angle, as early climate change is the undertone of the content of this article in terms of the findings and trends presented. Rather the author focuses on comparing the 40 year monthly average rainfall with the 1924 monthly average rainfall for East London (Unknown, *The Daily Dispatch*, 6 January 1925). The following is the conclusion of the article, along with the graph under discussion (Figure 5.2.1.1):

> "The chart below shows how the rainfall for 1924 compares with the mean annual rainfall for the past forty years. It will be seen that with the exception of January and December, every month of the year had a rainfall much under the average. [For December 1924 the monthly average rainfall was 5.2 inches [132mm]. The yearly average of 1924 rainfall was 22.6 inches [574mm]. while the 40 yearly average rainfall for 1884-1924 was 33.88 inches [860.6mm]" (Unknown, *The Daily Dispatch*, 6 January 1925.

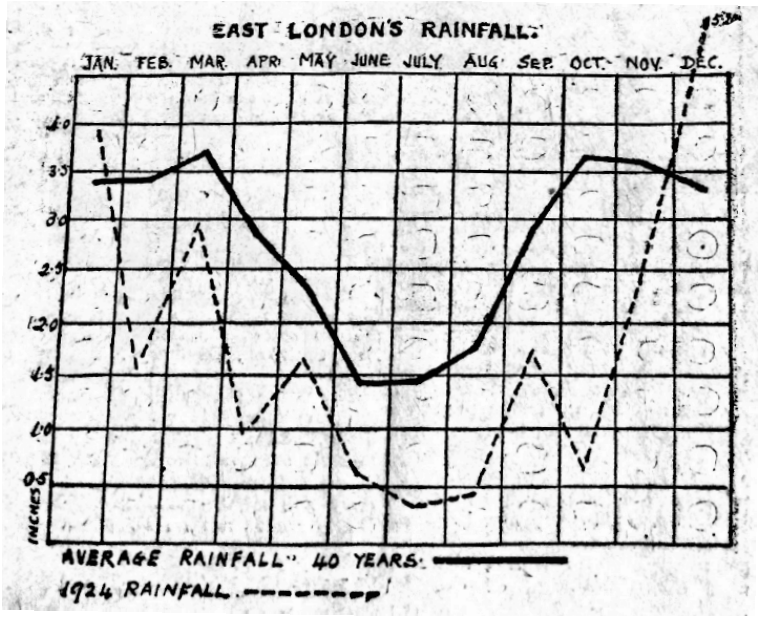


Figure 5.2.1.1: 40 year monthly average rainfall compared with monthly average 1924 rainfall for East London (After Unknown, The Daily Dispatch, 6 January 1925)

Lastly, the amount of sources referenced was based solely on each authors' preference and the subject matter covered as no further inference could be ascertained.

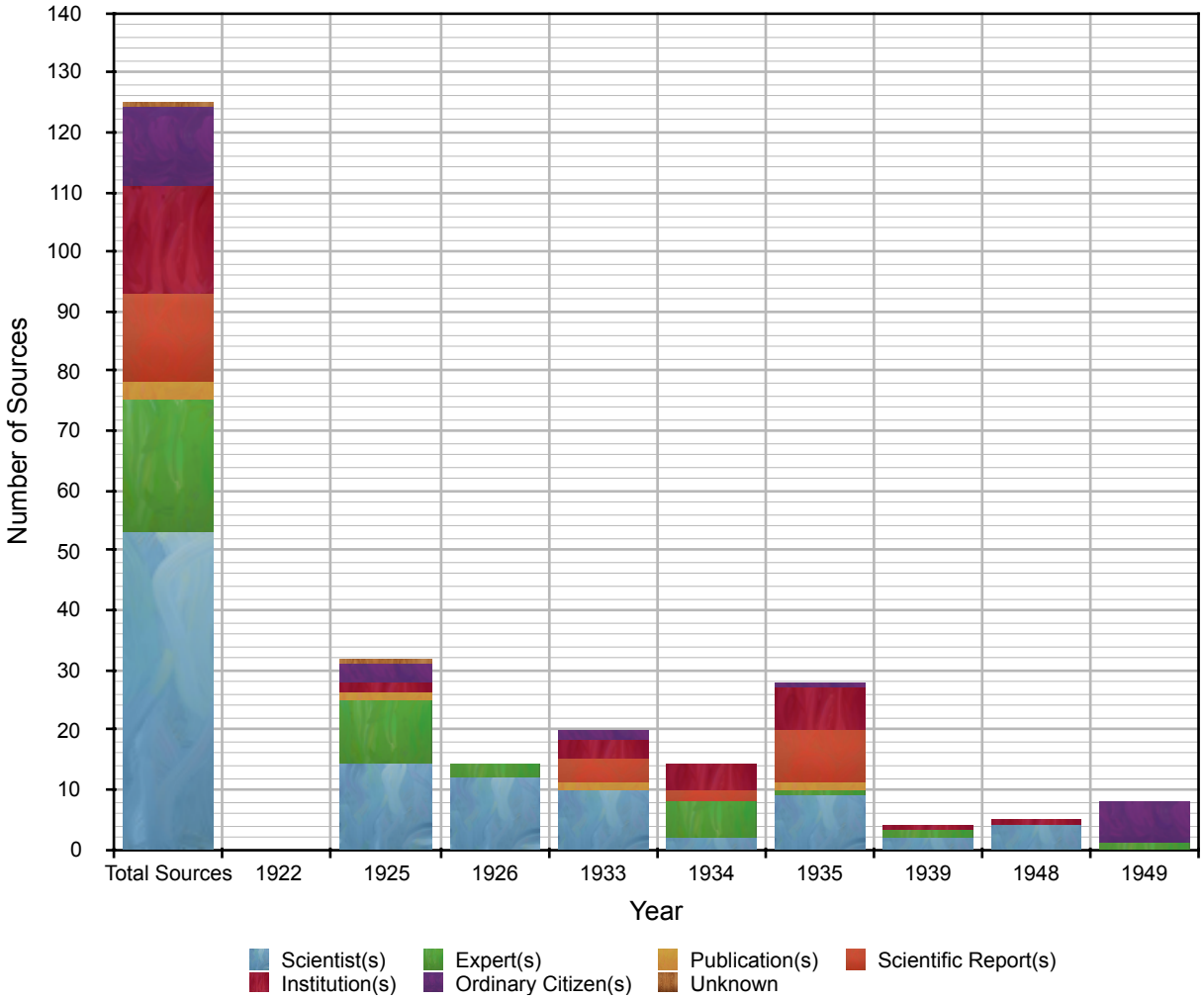


Figure 5.2: Article Sources By Year

In terms of source origin, of the total of 125 sources across 39 referenced articles: 73 or 58.4% are local, 31 are international (24.8%) and 21 sources' origin was unspecified (16.8%) (Figure 5.2.1 and Table 5.2). Furthermore, local source usage per source category in descending order are: 11 ordinary citizen(s) (84.6%), 13 institution(s) (72.2%), 2 publication(s) (66.7%), 14 expert(s) (63.6%), 8 scientific report(s) (53.3%) and 25 scientist(s) (47.1%) (Figure 5.2.1 and Table 5.2). The scientist(s) source category is the only source category not comprised of at least 51% local sources due to it is also being the source category with the highest percentage of international sources (17 out of 53 or 32.1%) and sources with unspecified origin (11 out of 53 or 20.8%). It is postulated that these 11 scientists along with other

sources of unspecified origin could have been introduced in greater detail in a prior article, one which did not meet the analysis criteria of this dissertation or was not present in the SAWS archive. Shifting to the international stage, when breaking down international sources by origin the following was extrapolated, in descending order: American (14), German (7), British (3), Australian (2) and a source each that were Danish, French, Italian, Indian and Japanese (Figure 5.2.1). The underpinning reason for American sources being the dominant international sources used is in part due to the subject matter covered, aside from the aforementioned examples of “Huge Afforestation Plan in America” and “Effects of Trees on Climate” (4 sources), the primary reason for a large proportion of American sources (6) being referenced was directly linked to authors covering solar variability and ENSO resulting in authors to reference sources outside of South Africa and the United States in particular, to be discussed in detail in Subsection 5.3: Subject Matter. (Unknown, The Star, 23 July 1934; Unknown, The Star, 24 July 1934).

Another trend that was uncovered was that authors predominantly relied on sources of mostly western origin (29 out of 31 international sources), with the exception of an Indian scientific report and a Japanese scientist (Figure 5.2.1). As colonial rulers dictated the overseeing direction, policies and practices of not only the weather bureaus but of the governmental departments of their colonies as well, ultimately affecting society at large, it must therefore be noted that sources of western origin during this time period includes territories under western colonial control at that time, such as Australia and India under British rule. Upon further investigation it was found that authors subliminally and in a lesser number of articles explicitly praised western sources and in some cases simply referenced the western origin of the source as a sign of ‘scientific superiority’. The utilisation of western sources is argued to have been that they were seen as a barometer of expertise, that offered a kind of 'scientific superiority’ when compared to non-western sources. This aforementioned suggestion is also explicitly made in two articles, one published in 1928, a reflection piece, and the other in 1948, a feature, where the journalists neglects to even mention their western sources by name but rather solely by their nationality. By solely relying on naming their sources by nationality, this signifies that experts and scientists of western nationality, and the publications that originate therefrom, along with western institutions, was held in higher regard than non-western experts, scientist, scientific publications, and institutions. For example, in the 1926 article titled “The Weather”

the journalist praised French and American scientists by writing: “In any case it is an interesting fact that imaginative meteorologists both in France and America advanced the view, some months ago, that sunspot and other conditions might make 1926 a year quite out of the ordinary” (Unknown, The Star, 7 January 1926). Moreover, to summarise the another explicitly praising 1948 article titled “Rains Not What They Were” the journalist first criticizes the South African Drought Investigation Commission for denying a drought in 1923, even though farmers continued to suggest this. Thereafter, the journalist of said article brought to light a local meteorologist’s (Dr. T. E. W. Schumann) findings on the Karoo for years past, whereby it had received an average rainfall far below the average for the 1890’s and early years of the 20th century (Unknown, The Star, 6 April 1948). The journalist then continues by making reference to, all the while praising a Danish scientist’s publication, of a world weather map indicating that rainfall over Africa from 1910 to 1940 was lower than in the preceding years which ultimately resulted in the Danish research spurring on further investigations by the South African government (Unknown, The Star, 6 April 1948). Therefore, these aforementioned explicitly praising examples, along with the other subliminally praising articles, add to the argument that western sources were seen not only by authors as more influential and specialised than those from other parts of the world, but to a degree also by local scientists and experts as being ‘scientifically superior’, and possibly transferring, and reinstating that belief in plain view of local readers.

The ‘scientific superiority’ view of an author is argued to have originated as as result of either one or a combination of multiple variables such as: (i) racial bias, (ii) an actual higher quantity, and quality of western meteorological related research outputs, including outputs on early climate change (iii) political interference, (iv) the press itself and (v) language barriers. Firstly, racial bias could have very well been a discriminating factor as authors could have excluded non-western sources for western sources, particularly when seen in combination with political interference, the political context of South Africa at that time, as discussed in Chapter 2: Literature Review. Secondly, an actual higher quantity, and quality of western meteorological related research outputs, including outputs on early climate change could have been the case for the use of some western sources. This could be especially true for the American sources as they were the most referenced international source group (14) and, as discussed in Chapter 2: Literature Review, the Americans were at the

forefront of climate change scientific enquiry, in part due to their bloated military budget, ultimately the results of which ushered in contemporary climate change in the 1950s. Thirdly, political interference would globally lead to two world wars which could have impacted the press itself as newspapers cut down on staff or diverted staff to cover the wars and local newspaper correspondence between international newspapers and sources were intentionally limited and in particular could have resulted in only 'allied' sources being used. Furthermore, political interference also impacted the press' ability to cover meteorological and climatological related news so as not to give enemies an understanding thereof — this was evident in *The Army News* being published and archived by SAWS librarians and how South Africa's army forced newspapers to retract any meteorological and climatological related news. For example, South Africa's army had multiple expeditions to the various islands of South Africa to establish bases and weather stations and the media was forbidden from publishing on such developments. Lastly, language barriers could be argued for as English American, Australian and British sources accounted for the majority of international sources total of 19 sources or 61.3%, a further 10 was for other non-English western sources (32.3%) with German sources accounting for 6 of these 10. Interestingly, the usage of 10 non-English western sources again points to racial bias, political interference and an actual higher quantity, and quality of western meteorological related research outputs. Therefore, 'scientific superiority' view of an author is argued to have originated as a result of either one or a combination of the multiple variables discussed.

It was identified that 1925, 1933 and 1949 contained the highest percentage of local sources across all articles published (75%) (Table 5.2). The reason for this trend for articles published in 1925, 1933 and 1949 was that out of the combined total of 17 articles published across all three years, 12 made no clear identification as to what facet of climate change was covered, 16 articles' overarching terminology covered was that of a change in rainfall and subsequently the same 16 articles covered the dominant process(es) of a decrease in rainfall, further discussed in the next subsection. Ironically the year after one of the years with highest percentage of local sources across all articles published was 1926 — achieving the lowest percentage of local sources used overall at 14.3%, excluding the aforementioned "Advance of the Desert" published in 1922 which had no sources (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). The reason for 1926 accumulating the lowest amount for

local sources used is directly linked to it being an anomalous year, where 4 of the 6 articles covered the natural facet of climate change and subsequently solar variability as the overarching terminology, again feeding back into the previous argument made that American sources were mainly referenced due to articles covering solar variability, which will also be further discussed in the next subsection — 5.3: Subject Matter. Lastly, one article published on 6 April 1948 titled “Rains Not What They Were” contained the highest average number of sources per article published with five sources, as it’s author provided a detailed account of various views on the scientific consensus of the time, previously discussed (Table 5.2). In sum, no correlations between the average number of sources used per article and percentage of local sources used per year could be extrapolated. Therefore, no underlying reason was identified other than that article subject, subject matter, and author source preference were the catalysts for a particular number of sources being referenced and in those sources being local or international.

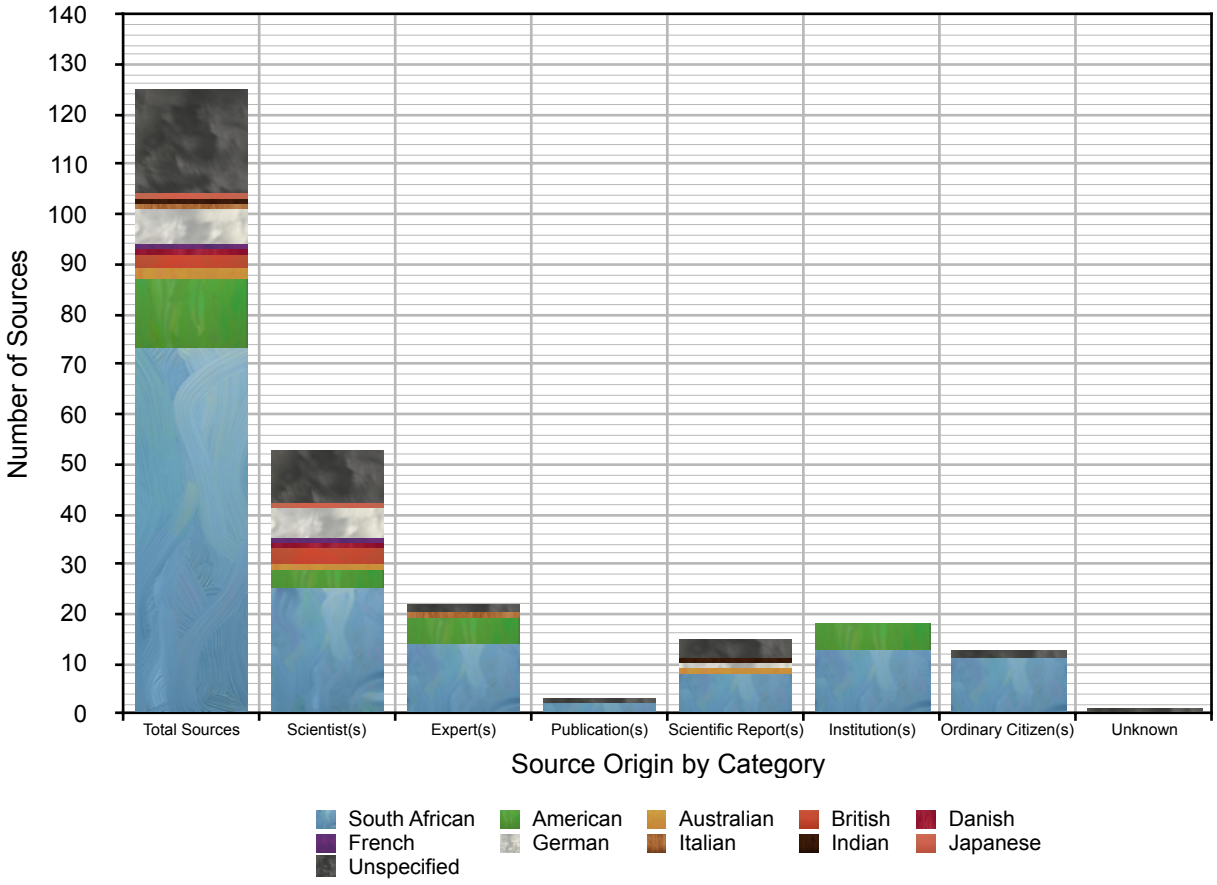


Figure 5.2.1: Source Origin by Category

Table 5.2: Percentage of source(s) across all articles per year that are local, and average number of source(s) per article published in given years

Year	Total Number of Sources	Number of Local Sources	Number of International Sources	Unspecified Source Origin	Percentage of Sources that are Local	Number of Articles per Year	Average number of Source(s) per article published in given years
1922	0	0	0	0	0,0%	1	0
1925	32	24	3	5	75,0%	8	4
1926	14	2	7	5	14,3%	6	2.3
1933	20	15	2	3	75,0%	7	2.9
1934	14	4	8	2	28,6%	7	2
1935	28	18	6	4	64,3%	6	4.7
1939	4	1	3	0	25,0%	1	4
1948	5	3	2	0	60,0%	1	5
1949	8	6	0	2	75,0%	2	4
Total	125	73	31	21	58,4%	39	3.2

5.3 Subject Matter

The following subsection discusses the findings after analysing an article's core subject matter; these include the following three pillars, all pertaining to early climate change: (i) facet, (ii) the overarching terminology used and (iii) the dominant process(es) (Table 5.3). The dominant facet covered by the articles was not clearly identified (24 articles), argued to be due, in part, to the local-global weather nexus: a lack of a scientific climate change consensus on whether local and global weather and local and global climate was interlinked, whether they had an any influence on one another. To elaborate by means of a practical example, as previously discussed in part, for the reflection piece titled "The Weather" (Unknown, *The Star*, 7 January 1926). The questioning by the journalist as to whether or not global weather, and therefore climate, is interlinked, including but not limited to questions pertaining to whether global scale weather phenomena such as hurricanes and droughts can influence local weather, and climate, and visa-versa. For the sake of brevity, these aforementioned questions on global weather and climate, and local and global weather and climate, interlinkages are seen as both a South African scientifically held

consensus as well as an article structure used by a journalist, including other authors, and will from here on be amalgamated and simplified into the term: local-global weather nexus. In endorsement of the local-global weather nexus argument, the journalist of the other reflection piece, for example, titled “Waiting for the Rain” starts off by stating: “The view we advanced six weeks ago as to the present weather being connected with world-wide conditions, has received a great deal of support during the interval” (Unknown, *The Star*, 12 January 1926). Thereafter, the journalist of “Waiting for the Rain” mentions the large scale ‘abnormal’ record breaking weather phenomena occurring around the world, such as floods in Europe, the United States, Australia, and the Congo, then proceeds to proclaim that volcanic, Mount Vesuvius (Italy) in particular, and sunspot activity could be the cause of the phenomena, before writing in more detail on the latter:

> “Sunspots have immediate effects on magnetic conditions in the earth, but their influence on weather, particularly on rainfall, has never been shown to be immediate or direct; what does seem indicated is a general condition of affairs over a period of years associated with a condition of the sun, of which the sunspots are merely symptoms. In any case, rainy seasons and not drought have usually been associated, in South African experience, with periods of sunspot activity” (Unknown, *The Star*, 12 January 1926).

Thereafter, the journalist concludes their article by critiquing the South African government for not better assisting farmers as they were yielding low crop volumes due to the impacts of the current heatwave being experienced at that time (Unknown, *The Star*, 12 January 1926).

Moore’s series of articles, “The Drought Problem in South Africa [Pt. 1 and Pt. 2]”, published in 1935 further highlights the local-global weather nexus and scientific knowledge gaps in general. In the first article of Moore’s series, Moore investigates the then current opinions on the ‘drought problem’ also referred to as the ‘drying up’ theory/prophecy by focusing on potential underlying causes and popularised possible solutions (*The Sunday Times*, 11 August 1935). Moore describes the underlying potential causes as follows:

> "So much has been written about the drought problem in South Africa, and the variety of opinions as to the cause and the solution is so bewildering, that the layman is apt to grow confused. I propose to set forth the main arguments and to show on what lines an investigation should be conducted to arrive at a solution of this important problem. There can be only three reasons for the drying up of a country:
> A progressive decrease in the rainfall;
> Excessive drainage by rivers to the sea; or
> Excessive evaporation" (Moore, *The Sunday Times*, 11 August 1935).

For the first potential underlying cause, a progressive decrease in rainfall, Moore argues that when "Taking the rainfall up to about 1926, we find that, on the whole, the decrease has been slight, though in some places it has been as much as 25 per cent. This, however, is the effect of drought and not the cause, as I shall explain later" (*The Sunday Times*, 11 August 1935). Ironically, even though Moore confirms that rainfall in some places has decreased by as much as 25%, Moore explains that "[This] decrease, on the average, is too small to cause the country to dry up, so we must look elsewhere for the reason" (*The Sunday Times*, 11 August 1935). Perplexingly, without any further corroborative details on the first potential underlying cause, Moore addresses the second underlying cause for the 'drying up' of South Africa; excessive drainage by rivers to the sea. Moore argues that a loss of 7% of South Africa's rainfall, according to the Meteorological Office, that flows to the sea via rivers "… is negligible and cannot account for the drying up of the country" (*The Sunday Times*, 11 August 1935). Therefore, Moore argues that it is in fact excessive evaporation which is the underlying cause for South Africa's 'drying up' (*The Sunday Times*, 11 August 1935). The following extract is comprised of supportive statements Moore made to reach the conclusion that excessive evaporation was the underlying cause:

> "The cause than, therefore, [can] only be excessive evaporation. Authorities are agreed that evaporation is far too high and must be checked, but they differ as to the cause and remedy. If the greater part of the evaporation took place from free water surfaces and vegetation all would be well, but the tragic fact is that no less than 83 per cent. of our rainfall is evaporated from the soil itself. When rain falls on bare soil it

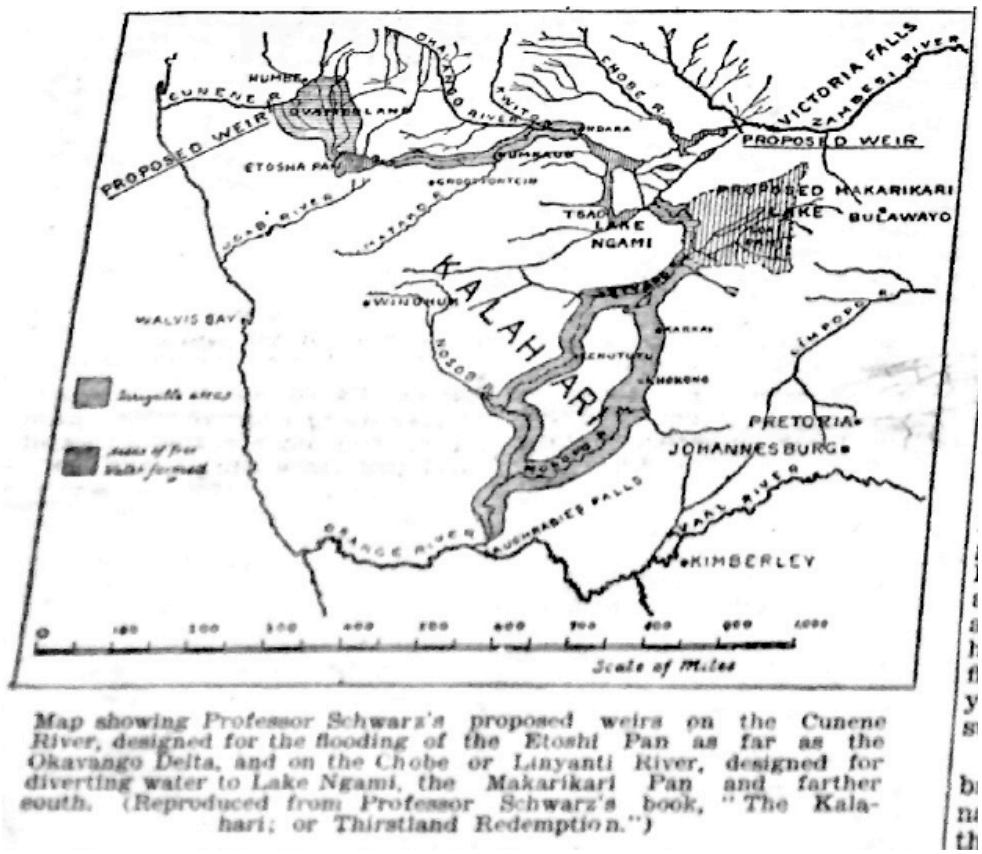
> does not sink into the ground, but is again evaporated in a day or two. Thus it does not feed the underground reservoirs and fountains, nor does it sustain plant life. It is therefore totally useless. Where, however, the ground is covered with vegetation, the soil is protected from the heat of the sun and most of the water sinks into the ground to replenish the underground water supply, to feed our fountains, and to nourish trees and vegetation. A further evil of the denudation of the soil lies in its effect on the rainfall. The ground, being bare, becomes heated and heats the air above it, causing strong upward air currents, which force the clouds up too high for their moisture to be precipitated in the usual way" (Moore, *The Sunday Times*, 11 August 1935).

The proposition made by Moore, that the underlying cause for the 'drying up' was due to an excessive evaporation rate, and it is argued that Moore is actually alluding to an increase in temperature as the direct underlying cause resulting in an excessive evaporation rate with a decrease in rainfall as an indirect consequence of the former increase in temperature. Moore's proposition explicitly highlights a lack of not only meteorological but climate change understanding as well by the scientific community, authors and society at large. For example, only a few authors and sources proposed that an increase in temperature could also be a catalyst for a decrease in rainfall, but most pressing is that many authors and sources did not make the connection that various climate change processes could be working in tandem with one another. Hence, this represents another lapse of understanding on the part of authors and sources, which in turn this lapse of understanding also shares a distinct resemblance with the previously made local-global weather nexus arguments. Essentially it is argued that both early climate change, including its facets, overarching terminologies and processes, and the local-global weather nexus are understood and thereafter portrayed by many authors and sources as closed systems, isolated aspects which do not interact with one another. Moore continues by providing further proof of these arguments by describing the then current scientific consensus, which ironically was not a consensus held by the South African scientific community rather by the public:

> "There are at present two schools of thought, one of which attributes the drying up of the country to the vandalism of man, the other to natural causes [previously explained]. They find it difficult to discover some basis

> of agreement, mainly because both are right! We will take the case of vandalism first. The fact must be faced that in hot countries lying within the temperate zone, with large inland areas, the problem of destruction of vegetation presents itself as soon as the country becomes populated and the vegetation, which already finds existence difficult, is subjected to fires and over-stocking, while trees are cut down to provide fuel and timber" (Moore, *The Sunday Times*, 11 August 1935).

Moore's exclaimed argument that both schools of thought are right again exemplifies the lack of meteorological and climatological knowledge, a lack of knowledge and therefore a lack of a scientific consensus. The lack of a scientific consensus, other than not viewing the local-global weather nexus as interlinked and that South Africa was not progressively becoming drier, to be discussed in more detail throughout this Subsection, also provides an insider's view into the difficulties imposed upon early climate change article authors. Essentially authors were the deciding authorities and had to either describe one or both schools of thought, based on their own knowledge and/or their source's knowledge, however limited this knowledge may be. Moore concludes by arguing that the Kalahari scheme, to be described in more detailed throughout this subsection as well, is the only multifaceted solution to the 'drying up' problem, supported by Geologist Mr. E. Heyes and author Dr. A.L du Toit, as water diverted to the dried-up lakes will result in the following: (i) soil will once again be moist giving rise to vegetation, (ii) the air would be humid once again and (iii) the cost of the scheme would cost the same as the Vaal-Hertz scheme, £4 million (*The Sunday Times*, 11 August 1935). The proposed methodology of the Kalahari scheme is also illustrated and provided in the form of a map, which indicates where water will be diverted with the use of weirs (Figure 5.3.1.1) (Moore, *The Sunday Times*, 11 August 1935).



Map showing Professor Schwarz's proposed weirs on the Cunene River, designed for the flooding of the Etoshi Pan as far as the Okavango Delta, and on the Chobe or Linyanti River, designed for diverting water to Lake Ngami, the Makarikari Pan and farther south. (Reproduced from Professor Schwarz's book, "The Kalahari; or Thirstland Redemption.")

Figure 5.3.1.1: Map showing the proposed methodology of the Kalahari Scheme (After Moore, *The Sunday Times*, 11 August 1935).

The second article that forms part of Moore's series, "The Drought Problem in South Africa [Pt. 2]", continues arguments made in Pt. 1 of the series. These aforementioned arguments by Moore, will be extracted and briefly discussed from hereon to provide context to Moore's arguments, which mainly are in support and defence of the undertaking of the Kalahari scheme, and subsequent knowledge of early climate change and therein the consequential reasons for why this article has been categorised the way it has according to subject matter (Table 5.3). First, Moore addresses the misconception of South African moisture that is derived from the oceans and blown inland via wind and thereafter argues that inland sources of water such as the proposed refilling of the dried Kalahari lakes would be of benefit:

> "The usual conception of our rainfall system is that the winds are continually blowing from the sea over the land. Investigations carried out by the Meteorological Department prove that this is very far from the truth. Whether the place is Durban, East London, Cape Town or Swakopmund, the winds are found to move parallel along the coast, and there is very

> little movement from the land to the sea or vice versa, and the movement is, for the most part, purely local. … It will therefore be understood that the proportion of 30 per cent., which is the percentage of the rainfall in England evaporated from the sea, is probably much nearer 20 per cent. here, and inland sources of moisture are thus of greater importance to this country. But these, to be of value, should not come from the sub-continent itself, as this means that the atmosphere draws upon the land itself for its moisture, which again falls as rain. Each time this happens part of it escapes to the sea, and so the water supply gradually dwindles. This objection applies to the scheme of afforestation and small dams. The rivers flowing into the Kalahari all rise in the Angola Highlands, which is in the equatorial rain-belt. Hence, the water we would obtain from the Kalahari lakes comes from an outside source, and serves us as the sea serves the country it surrounds" (Moore, *The Sunday Times*, 18 August 1935).

Thereafter, Moore makes use of annual average rainfall for Great Marico 1914-1932 (Table 5.3.1.1) as a case study to highlight a decrease in rainfall as a trend and that areas lying south of the Kalahari, such as the Great Marico are becoming drier, and expands on a study undertaken by German scientists in 1910:

> "It will be seen that the last five years [Table 5.3.1.1] show a continuous decline to 13 inches, the lowest within history. Previous to 1927 there were never more than two bad years after a good one. Marico still has its indigenous vegetation, so that the drying up of the country cannot be ascribed to denudation of the soil, yet its orchards of dead citrus trees attest to the fact that it is no longer the "Garden of the Transvaal." We can still expect good years, as the past year has been, but they will become progressively fewer in number. It is a significant fact, too, that the areas which have dried up most rapidly lie due south of the Kalahari, over which the rain-bearing winds pass before they reach them. … I want to stress the fact that only one investigation on meteorological lines has been carried out, and that was by German scientists in 1910, who came to the conclusion that the drying up of the Kalahari lakes was the primary cause

> of the increasing drought in the sub-continent" (Moore, *The Sunday Times*, 18 August 1935).

Moore continues by refuting criticisms levelled against the Kalahari Scheme by Dr. Schumann:

> "A point of criticism is that the area of the Kalahari lakes is too small (Dr. Schumann places it at 17,000 square miles) to supply sufficient moisture to regenerate the climate, though it is far greater than the area of a network of small dams would be. … These critics also forget that owing to the Kalahari being so level the water in the lakes and rivers will soak into the surrounding areas, thus enabling trees and vegetation to gain a hold. Trees and vegetation with their roots in water transpire more moisture than that evaporated from a lake. There will thus be available not merely the area of the lakes, but the greater part of the Kalahari Desert, which covers an area about half that of the Union. The last point of criticism is that the rivers cannot supply sufficient water for evaporation. It must be remembered that the Angola Highlands have been drying out in common with the rest of the sub-continent, and their rainfall will increase when the lakes are established. No one is so optimistic as to expect an immediate improvement: the drying-out process has gone on too long, and improvement will take time—the usual estimate is up to ten years" (Moore, *The Sunday Times*, 18 August 1935).

Interestingly, Moore continues by describing in greater detail the German expedition of scientists who studied the 'drought conditions' in what is known today as Namibia in 1910 (Moore, *The Sunday Times*, 18 August 1935). Furthermore, Moore sources the Drought Commission's report in support of the German expedition's findings, along with the previously discussed Kalahari scheme, as a means to drive the argument that South Africa was indeed drying up:

> "I have information supplied to me by a man of the highest integrity of a report made by a secret German expedition which was sent out in 1910 to study and report on drought conditions in South-West Africa. They spent two years in the Kalahari collecting data, studying the formation of the

> country and the rivers, and investigating the air currents and atmospheric conditions by means of instruments attached to kites. In their report they stated that if the Kalahari lakes were not restored, the whole sub-continent south of the Zambesi would become a desert, starting with the Kalahari and spreading gradually to the coast. The process would be slow at first, but would be rapid once the Kalahari had become completely dry. This would occur within 100 years at most and probably within 50 years. Twenty-five years have passed, and the prophecy is in a fair way of being fulfilled. In the words of the Drought Commission, "If the present conditions are allowed to continue … the logical outcome of it all is the 'Great South African Desert,' uninhabited by man"" (Moore, *The Sunday Times*, 18 August 1935).

Moore redirects the reader to the facet of anthropogenic climate change in the forms of conservation, water and vegetation, and better farming and veld management practices as practical short-term solutions to the 'drought problem', with the undertaking of the Kalahari scheme as a long-term solution (*The Sunday Times*, 18 August 1935). For example, Moore strongly discourages veld-burning as "Veld-burning on mountain slopes has a most deleterious effect on the vegetation, and the act should be made a penal offense" and argues that "Where denudation has already taken place, afforestation should be carried out" (*The Sunday Times*, 18 August 1935). Furthermore, Moore proposes medium-term solutions to the 'drought problem' which include smaller dam construction projects, which would capture the 7% of river run-off to sea (*The Sunday Times*, 18 August 1935). Moore concludes by driving the argument that South Africa was indeed drying up: "What urgently requires our attention is the great proposition of our rainfall which is lost by evaporation, the causes of which we are still uncertain of. It appears that the continual decrease since 1890 will continue, and a waiting policy may be fatal to us" (*The Sunday Times*, 18 August 1935). Moreover, Moore advocated for more research to be undertaken (*The Sunday Times*, 18 August 1935) In sum, Moore's series of articles provides a thorough overview of the then scientific consensus on the topic of early climate change and knowledge gaps (local-global weather nexus), all the while Moore also acted as a vehement supportive actor in favour of the undertaking of the Kalahari scheme as a means to the end of the 'drought problem', regardless of whether the underlying cause was known or not (*The Sunday Times*, 18 August 1935). As

Moore's series of articles covers both facets of early climate change, or 'both schools of thought' according to Moore, the series of articles was categorised accordingly.

Table 5.3.1.1 Annual average rainfall for Great Marico 1914-1932 (After Moore, The Sunday Times, 18 August 1935)

Year (data taken from July to June)	Rainfall (in inches)
1914	38
1915	22
1916	23
1917	30
1918	24
1919	24
1920	36
1921	22
1922	32
1923	23
1924	47
1925	16
1926	21
1927	33
1928	25
1929	24
1930	19
1931	18
1932	13
Total Average 1914-1932	**25.8 (65.5 cm)**

Following a no clear identification in terms of the facet covered by early climate change articles was both natural and anthropogenic (9), natural (5) and anthropogenic (1) (Table 5.3). On the one hand the natural aspect of the both natural and anthropogenic facet was mainly driven by anthropogenic actives such as land use changes and deforestation, also described in Moore's aforementioned articles, while on the other hand the natural aspect of this facet was mainly driven by natural

aspects such as weather and climate variability, volcanic and solar forcings. Solar variability in particular was solely the reason that the natural facet was covered. Lastly, anthropogenic activities covered by Erlank, such as poor water management and land use changes resulted in the article being categorised as covering the anthropogenic facet — “63-Year-Old Rainfall Records for New Bethesda Analysed”, to be further discussed in detail in this Subsection (Erlank, *The Graaff-Reinet Advertiser*, 10 January 1949).

The dominant overarching terminology covered by the articles was that of a change in rainfall patterns (27 articles) and subsequently the dominant process covered was that of a decrease in rainfall (26 articles). The reason for this aforementioned finding was due to Prof. Schwarz and their ‘drying up’ theory garnering and fostering media attention and the subsequent support of the public and even journalists, and in turn their combined support opposed the South African scientifically held consensus which was that South Africa was not drying up. Following a change in rainfall patterns as the dominant overarching terminology was solar variability (5), a change in temperature (4), a dual change in rainfall and in temperature (2 — “The Drought Problem in South Africa [Pt.1 & 2]”, The Sunday Times, 11 and 18 August 1935) and ENSO (1). Moreover, following a decrease in rainfall as the dominant process was an increase in natural disasters (4), an increase in temperature (3), dual usage of a decrease in rainfall and an increase in desertification (2), tri-usage of a decrease in rainfall, increase in temperature, and an increase in evaporation (2 — “The Drought Problem in South Africa [Pt.1 & 2]”, The Sunday Times, 11 and 18 August 1935), a decrease in temperature (1) and sunspot influence in general (1). In sum, the reason for this aforementioned findings was due to Prof. Schwarz and their ‘drying up’ theory garnering and fostering media attention and the subsequent push back from civil society in not accepting the South African scientifically held consensus which was that South Africa was not drying up.

Table 5.3: Article’s Core Subject Matter

Article Title and Year	Facet	Overarching Terminology	Dominant process(es)
Advance of the Desert (The Cape Argus, 26 August 1922)	No clear identification	Change in rainfall patterns	Dual usage of a decrease in rainfall and an increase in desertification

Article Title and Year	Facet	Overarching Terminology	Dominant process(es)
The 1924 Rainfall (The Daily Dispatch, 6 January 1925)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Kalahari Scheme (The Star, 8 Apr 1925)	No clear identification	Change in rainfall patterns	Decrease in rainfall
The Kalahari Scheme (The Star, 24 Apr 1925a)	No clear identification	Change in rainfall patterns	Decrease in rainfall
“Thirstland” redemption (The Star, 25 Apr 1925b)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Correspondence (The Northern News, After 25 April 1925)	No clear identification	Change in rainfall patterns	Dual usage of a decrease in rainfall and an increase in desertification
Wet and dry (The Star, 5 May 1925)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Secrets of the weather (The Star, 9 May 1925)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
A time of storms (The Star, 1 Dec 1925)	Natural	Solar variability	Increase in natural disasters
The Weather (The Star, 7 Jan 1926)	No clear identification	Change in temperature	Increase in temperature
Waiting for the rain (The Star, 12 Jan 26)	Natural	Solar variability	Sunspot influence on global rainfall patterns is questioned
Sun and weather (The Star, 16 Jan 26)	Natural	Solar variability	Increase in temperature
The hurricane month (The Star, 25 Apr 1926)	Natural	Solar variability	Increase in natural disasters
Frost does damage in the city (The Star, 23 Jul 1926)	No clear identification	Change in temperature	Decrease in temperature
A cyclone year (The Star, 10 Nov 1926)	Natural	Solar variability	Increase in natural disasters
Readers’ Po… (The Rand Daily Mail, 16 Oct 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall
The Remedy for Drought (The Rand Daily Mail, 17 Oct 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Is the Union Drying Up? (The Pretoria News, 23 Nov 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Changed S.A. Rainfall (The Rand Daily Mail, 24 Nov 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Drying Up? (The Daily Dispatch, 25 November 1933)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
Prophet Versus Expert (The Pretoria News, 30 Nov 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall

Article Title and Year	Facet	Overarching Terminology	Dominant process(es)
“Prophet Versus Expert” (The Pretoria News, 9 Dec 1933)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Strange weather (The Star, 11 June 1934)	No clear identification	Periodic change of ocean currents (‘ENSO anomaly’)	Increase in natural disasters
Huge afforestation plan in America (The Star, 23 Jul 1934)	No clear identification	Change in temperature	Decrease in rainfall
Effects of trees on climate (The Star, 24 Jul 1934)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Development of the Kalahari [Pt.1] (The Sunday Times, 19 August 1934)	No clear identification	Change in rainfall patterns	Decrease in rainfall
Development of the Kalahari [Pt.2] (The Sunday Times, 26 August 1934)	No clear identification	Change in rainfall patterns	Decrease in rainfall
The Kalahari and Our Climate [Pt.1] (The Sunday Times, 2 September 1934)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
The Kalahari and Our Climate [Pt.2] (The Sunday Times, 9 September 1934)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
Is South Africa Drying Up? (The Rand Daily Mail, 8 Jan 1935)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
The Drought Menace (The Rand Daily Mail, 9 Jan 1935)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
Not So Dry (The Rand Daily Mail, 9 Jan 1935)	No clear identification	Change in rainfall patterns	Decrease in rainfall
The Drought Problem in South Africa [Pt. 1] (11 August 1935)	Both natural and anthropogenic	Dual usage of a change in rainfall patterns and a change in temperature	Tri-usage of a decrease in rainfall, increase in temperature and an increase in evaporation
The Drought Problem in South Africa [Pt. 2] (18 August 1935)	Both natural and anthropogenic	Dual usage of a change in rainfall patterns and a change in temperature	Tri-usage of a decrease in rainfall, increase in temperature and an increase in evaporation
The Kalahari Scheme Again (18 August 1935)	Both natural and anthropogenic	Change in rainfall patterns	Decrease in rainfall
Scientists and weather “prophets” disagree (The Star, 14 Jan 1939)	No clear identification	Change in temperature	Increase in temperature
Rains not what they were (The Star, 6 Apr 1948)	No clear identification	Change in rainfall patterns	Decrease in rainfall
63-Year-Old Rainfall Records for New Bethesda Analysed (The Graaff-Reinet Advertiser, 10 January 1949)	Anthropogenic	Change in rainfall patterns	Decrease in rainfall
Eight Months Very Dry (The Graaff-Reinet Advertiser, 10 January 1949)	No clear identification	Change in rainfall patterns	Decrease in rainfall

In order to provide validity to the previously discussed findings, subsequent categorisations and context to the narratives several prime articles will be discussed in detail. It is arguably best to start at the genesis, the first article to be published on early climate change was published by *The Cape Argus* on 26 August 1922 and is titled “Advance of the Desert”. As one of the authors, Prof. Schwarz firstly criticises how little has been done after he first made his ‘grim prophecy’ five years ago, foretelling that South Africa’s rainfall would decrease and that desertification would increase (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). This article is arguably the most in-depth article which outlines two important interlinked narratives on early climate change, both proclaimed and developed by Prof. Schwarz: the prophecy that South Africa was ‘drying up’ and the Kalahari scheme. Futhermore, it is important to draw attention to this article, as it exemplifies how scientific factual information and to an extent scientific theoretical proposals can be misinterpreted and even misconstrued by other authors. In order to justify the former claims and the categorisation of this article’s subject matter, no clear identification, a change in rainfall patterns and a decrease in rainfall, an ample portion of the article will be extracted:

> “The difficultly about the whole matter [the undertaking of the Kalahari Scheme] is the vastness of the area concerned, the interests, international and native, to be considered, and the complicated nature of the effects that will follow when the lakes are restored. Meanwhile, the more the people who understand the nature of the project, the sooner will the scheme come into being. The project is divided into two parts a western half, the area involved lying to the north of South-West Africa, and the eastern half, the Kalahari proper. The first is entirely a native proposition; it is proposed to turn the Cunene River into its old channels which lead southwards and so restore Ovamboland to its pristine fertility. As if to prove my data, the Cunene River last year, for the first time in eighteen years, flooded the country, and my weir is intended to make constant what nature does on its own initiative at rare intervals. The eastern half, from an engineering point of view, presents many difficulties, but here, again, my weir across the lower Chobe River is intended to replace the obstruction formerly presented by a mass of reeds and sand, which was sufficient to bank up the waters of the Chobe and Okavanga Rivers sufficiently to

> make them flow southwards and fill up the Ngami and Makarikari depressions. Water leadings will be taken out at suitable places and brought down to the floodplains of the old central Kalahari River, whose southern end is now represented by the lower Molopo River. Between the Molopo and Ngami, the former course is sanded up and only a succession of vleys indicates the former connection of the Ngami region with the Orange River. … For 500 miles there is a level country, only waiting for water, to become a region as fertile as Egypt, for the soil, elevation and climate are eminently suited for white settlement. The crops, winter wheat, summer cotton and autumn mealies, would assure prosperity to the region, while if water is available, the area away from the actual irrigation plots is a magnificent ranching country" (Schwartz and Unknown, *The Cape Argus*, 26 August 1922).

During the remainder of the article, Prof. Schwarz continues by going into great detail about his knowledge of historical southern African hydrography, upon which he based the Kalahari scheme's rationale (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). Perplexingly, Prof. Schwarz does not discuss his theories on what the underlying cause of a decrease in rainfall is, rather he argues that current, for that time, climate change impacts resulted not only in a decrease in rainfall but in the air becoming less humid, with both the former and the latter argued as a catalyst for an increase in desertification (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). Furthermore, Prof. Schwarz proclaims that these aforementioned impacts compelled South Africans to migrate to areas less prone to these impacts (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). The following extract provides a greater overview of how Prof. Schwarz formed his arguments for the adoption of the Kalahari scheme. Prof. Schwarz's pro-Kalahari scheme arguments are based on white economic development by means of job creation in the agricultural sector due to irrigation becoming available as a result of the refilling of the dried lakes which in turn would increase migration (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). Other pro-Kalahari scheme arguments made by the Professor include: water management and the impact of climate change resulting in drier air, the arguments made on the former topic depicts what personal observations also propelled and compelled the Professor to develop his Kalahari scheme:

“One might say, why, then, live in the east under distressing circumstances; let the people migrate to the Western Province, or the Transvaal, where the conditions are better. That is precisely what the population is doing, as shown by the census returns, but the mischief of it all is that the conditions now prevailing in the central area are spreading, and more and more of our country is becoming unproductive. When the central lakes are restored, there will form a vapour cloud over them, which will spread and eventually cover the whole area within the circle of the coastal mountains, so that the central districts, instead of being hot and dry, will have sufficient moisture to keep the vegetation alive. It is not a matter of rainfall. In Lincolnshire I saw, near Grantham, a luxuriant field of [Lucerne] growing unirrigated under a rainfall of 15 inches [381mm]. So moist was the ground that the hills were gorged with water and springs were gushing out everywhere. This used to be the condition at Cradock, and the farmers who first took up land there built water-mills along the water-courses, which are still standing. Now these streams only contain water for a few hours after a thunder-storm, and the water wheels have long ago ceased to turn; the rainfall shows no such intensive diminution as to explain this. If one considers the evaporation, then the whole matter becomes clear. Evaporation is a way of estimating the moisture in the air; it depends on the fact that the dryer the air is, the more water will it absorb, so a tank of water is exposed to the air under natural conditions and the loss every day or week is made good by pouring more water into the tank. The amount added to fill up the tank to the mark is called the evaporation, and is measured as so many inches per square foot as in the case of rainfall. Now, in Grantham, with a rainfall of 15 inches, the evaporation is not half as much, so that less than half is required back by the air; the rest can sink in and nourish the roots of the plants, and a big surplus is available for the springs. In Cradock, with the same rainfall, the evaporation is 100 inches. [2540mm] or more than six times the rainfall. As a consequence, when the rain falls, before it can do any good to the veld or crops, it is sucked up by the air, and is lost. For irrigators, this enormous evaporation is very bad, as in order to wet the ground, four or five times as much water has to be run on to the ground as would be required simply to feed the crops. There is another bad effect that follows. When the air is

> reasonably moist and the evaporation is small, water that enters the soil from the surface, either as rain or as irrigation water, sinks in and any salts that may be in the soil of a deleterious nature are washed out or distributed. If, however, the air is so dry that a large part of the water immediately comes to the surface and evaporates, then the dissolved salts are deposited in the growing zone of the soil and the soil becomes brak. No amount of chemical or mechanical treatment will [cure] this as long as the air is as dry as [it] is to-day" (Schwartz and Unknown, *The Cape Argus*, 26 August 1922).

This article provides a compelling and unique perspective on both Prof. Schwarz and his Kalahari scheme. Essentially rather than researching more into the underlying causes of South Africa's rainfall, it is argued that Prof. Schwarz's results from his previous rainfall research propelled and compelled him to develop the Kalahari scheme, based on historical hydrography and personal observations, as a geo-engineered adaptation plan to address a decrease in rainfall (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). The second, unknown, author of the article concludes the article by professing their support for the adoption of the Kalahari scheme, as their personal observations corroborate Prof. Schwarz's proclaimed results, an increase in humidity (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). The author writes about Observatory, a suburb in Johannesburg, as being a prime example of how "once the lakes are established the vapour cloud [will] remain as a permanent covering" (Schwartz and Unknown, *The Cape Argus*, 26 August 1922). The author continues to conclude their article and subsequent support for the adoption of the Kalahari scheme by writing, in more detail, about comparing higher levels of humidity in Observatory to humidity levels of areas outside of this suburb. Essentially the author writes on human induced transpiration resulting in higher humidity levels in Observatory, as a consequence of citizens of this suburb planting and maintaining urban gardens:

> "In 1904 the evaporation was 92.3 inches [2344.4mm], about the same as it is still on the outside mines. After this a populous suburb grew up round the Observatory and people went in for gardens, planted trees, flower beds and lawns on a large scale, which they assiduously watered. As a result, the evaporation has steadily increased till to-day it stands at less

> than 50 inches [1270mm] a year. The area round is too dry to allow the evaporation ever to equal the rainfall of 50 inches, but the creation of the suburban gardens has [sustained this]" (Schwartz and Unknown, *The Cape Argus*, 26 August 1922).

One perplexing issue is that what both the authors of this article neglect to take into consideration is that by diverting water, either as presented in the Kalahari scheme or to urbanised suburbs for gardens with the aim of inducing higher humidity levels, the area which used to contain the potable water would thereafter be impacted by the same set of outlined impacts, including a diminished water supply. Nevertheless, this article has provided infallible insight into both Prof. Schwarz and his Kalahari scheme which continued to shape early climate change consensuses, both scientific and public, for decades to come. Lastly, Prof. Schwarz and/or their 'drying up' prophecy and/or their Kalahari scheme continued to be the catalyst for more articles on early climate change to be published. Specifically the 'drying up' prophecy, which is argued to have resulted in the vast majority of succeeding articles covering a change in rainfall patterns and subsequently a decrease in rainfall, started a debate on early climate change consensus in public view. Prof. Schwarz's 'drying up' prophecy opposed one of South Africa's scientific community's held early climate change consensuses, the other being the aforementioned local-global weather nexus, which was that South Africa was not drying up. The 'drying up' debate will be discussed in part in the coming articles and specifically in fuller detail in the next Subsection, where Dr. Schumann, Chief Meteorologist of the Union at the time, published findings which corroborated that South Africa was drying up, only to retract his statements in a later article, postulated due to political pressure from government and peer-pressure from his scientific colleagues.

In sum, the key arguments made by Professor Schwarz, which forms the foundational rationale for the development of the Kalahari scheme, is that South Africa's climate is changing, and in that change, is a prediction that South Africa's climate is one that is becoming dryer; a change in rainfall patterns, which he further argues that these impacts are already taking place (Schwartz and Unknown, *The Cape Argus*, 26 August 1922; Unknown, *The Star*, 8 April 1925; Unknown, *The Star*, 25 April 1925a; Unknown, *The Star*, 25 April 1925b). It is important to note that Professor Schwarz's key arguments represent a fundamental shift that opposes the

meteorological consensus of that time, in of itself representing what the consensus on climate change was, resulting in a backlash of scientists and experts lambasting Prof. Schwarz's key rationale arguments, by either speaking of current weather variables or on how climate change is a natural process that takes much longer to manifest impacts through its changing phases (Schwartz and Unknown, *The Cape Argus*, 26 August 1922; Unknown, *The Star*, 8 April 1925; Unknown, *The Star*, 25 April 1925a; Unknown, *The Star*, 25 April 1925b). It is also of importance to take note that whilst scientists and experts rallied against Professor Schwarz's climate change arguments, the rationale for the development of the Kalahari Scheme, they were significantly blunter when it came to Prof. Schwarz's adaptation methodology proposed in the Kalahari scheme (Schwartz and Unknown, *The Cape Argus*, 26 August 1922; Unknown, *The Star*, 8 April 1925; Unknown, *The Star*, 25 April 1925a; Unknown, *The Star*, 25 April 1925b). A clear example of this is, an article titled ""Thirstland" Redemption", where Professor Schwarz's theory is criticised (Unknown, *The Star*, 25 April 1925b). Dr. J.R Sutton, *a friend* of Professor Schwarz, leads the criticism, albeit sourced from a previously published article in the *Diamond Fields Advertiser*:

> "I know him to be an accomplished geologist of great skill in exposition, and in general I should hesitate before attempting to criticise any hypothesis he might broach, no matter what the subject. … But he has elected to make [his] scheme a fiery cross, and to start a crusade, with the support of a lot of freelance politicians quite incapable of weighing scientific evidence of any kind. He asserts and keeps on asserting and writing and lecturing that South Africa is drying up, and that he alone knows how to convert it into a Garden of Eden" (Unknown, *The Star*, 25 April 1925b).

The author of ""Thirstland" Redemption" continues to debunk, argument by argument, Professor Schwarz's scheme by interviewing geologists, botanists, engineers, and meteorologists on their criticism of the Kalahari Scheme (Unknown, *The Star*, 25 April 1925b). On the one hand, scientists and experts criticise the 'drying up' climate change argument made by Professor Schwarz, by providing explanations on continental drift, and on an aspect of natural climate change variability:

> "In time the continent [Gondwanaland] broke up, and its component parts floated (on the plastic underlying basic material) slowly northwards and westwards; the ice melted, to be succeeded by milder climatic conditions. … That the changes in this country from frigid to sub-tropical and semi-arid conditions must have taken place very slowly is proved by the great variety of thorns and succulents in the vegetation of the central parts" (*The Star*, 25 April 1925b).

Thereafter, scientists and experts continue their barrage of criticism by referring to the dried-up rivers as essentially being: "… no more than flood-water drains filled up at long intervals, like the Swakop was quite recently." (Unknown, *The Star*, 25 April 1925b). On the other hand, scientists and experts dissect and discredit the Kalahari Scheme's adaptation methodology. For example, Dr. Sutton lambasts the 'scientific' reasons for the adaptation methodology proposed:

> ""… there is nothing new in the idea of constructing vast 'evaporating surfaces' for the making of rain. The idea, like most other quack medicines, came originally from America years ago, and was promptly and uncompromisingly turned down by the experts of the United States Weather Bureau. … And he modestly estimates the extra rainfall over a great part of the tableland and anything up to ten more inches a year. He might as well have promised a thousand more inches, since, according to his argument, there can be no limit. The sad thing is that our Government is being persuaded into sending thousands of pounds over this scheme. A tenth of the money devoted to the needs of scientific meteorology would beget useful knowledge"" (Unknown, *The Star*, 25 April 1925b).

Ultimately, however, it is argued that it was Prof. Schwarz's adaptation methodology in the form of the Kalahari scheme as a whole that ended up being the achilles heel to Prof. Schwarz's entire reputation, as the science and findings behind the 'drying up' prophecy was actually admirable for that time and time and time again was the reason for the majority of articles covering a change in rainfall patterns and a decrease in rainfall as well as other scientists' similar scientific enquiries findings being sourced (Unknown, *The Star*, 8 April 1925; Unknown, *The Star*, 25 April 1925a; Unknown, *The Star*, 25 April 1925b).

The way in which the first author clearly defined and wrote of both natural and anthropogenic climate change in an article published in 1925 came about in a rather peculiar way. In said article, titled “Secrets of the Weather” (Unknown, *The Star*, 9 May 1925), the author questions South Africa’s changing climate, by firstly discussing an unusual out-of-season ‘cold snap’, and seeks their answers by interviewing Mr. C. Stewart, Chief Meteorologist, and Mr. G. W. Cox also of the Meteorological Office, two experienced sea captains, and Dr. Sutton of the Kenilworth Observatory. The distinction between natural and anthropogenic ‘climate change’ is made through the answers provided by these aforementioned interviewees. The author posed the following question to Mr. Stewart: “What is the meteorological explanation of the extraordinary weather we have had lately?” (Unknown, *The Star*, 9 May 1925). To which Mr. Stewart replies: “The explanation is that this year the high pressure has not moved on to the land in the ordinary course, and the result is that the equatorial belt of low pressure is still dormant. We are returning to normal, but the pressure is not yet so high as it ought to be at this time of the year and there is still a possibility of showers if the pressure does not rise” (Unknown, *The Star*, 9 May 1925). After the meteorological officials wrap up their explanations on the various variables to consider for the unusual weather occurring at that time, ‘climate change’ is once again brought into question by two experienced sea captains (Unknown, *The Star*, 9 May 1925). One sea captain argues, corroborated by another: “Here I have been voyaging for year after year … and yet I have never known anything exactly like this in my 35 years’ experience. Seasons used to be definite, but since wireless has been used to such an extent they seem to have altered and to have none of their old regularity” (Unknown, *The Star*, 9 May 1925). The shared views of the sea captains that anthropogenic activities are the cause for climate change, not as we know anthropogenic activities to be defined today such as the burning of fossil fuels that emit greenhouse gases, represents the first shift in the coverage of both facets. This notion that in some way human beings could be a catalyst for climate change is further questioned by the author: “As most seafarers of long experience have the same tale to tell it would possibly be of some advantage if meteorological experts could carry out tests over a long period and to see exactly what effect, if any, wireless has in disturbing weather conditions” (Unknown, *The Star*, 9 May 1925). The author then posed the wireless anthropogenic theory to Dr. Sutton to which they “… deprecated the suggestion that wireless was in any way responsible for the vagaries of the weather” (Unknown, *The Star*, 9 May 1925). Dr. Sutton continues to expand on

the explanations provided earlier in the article by Mr. Stewart and Mr. Cox, including explanations on the ‘adiabatic expansion’, ‘two opposing grand currents of air’, one being warmer than the other, and solar variability as natural not anthropogenic variables to consider for the abnormal weather experienced (Unknown, *The Star*, 9 May 1925). The conclusion of Dr. Sutton’s interview includes him divulging knowledge gaps, confirming his belief that the local-global weather nexus exists, and that more funding was needed;

> ““How these opposing grand currents arise and how they are maintained … is a problem still remaining to be solved by South African meteorologists. … It is a mistake to regard our rain and droughts as parish affairs. They are simply the local aspects of circumstances involving the whole southern hemisphere at large, and the belts of high barometric pressure encircling the world in our latitudes in particular. We should know more about these things if our Government would put a little more money into the business. At present the Meteorological staff at Pretoria has too big a load to carry”” (Unknown, *The Star*, 9 May 1925).

It is argued that the beliefs expressed by the sea captains, that wireless, an argued anthropogenic activity in laymen's terms, could possibly be the cause of ‘climate change’ and not solely natural variables incidentally captures a pivotal moment in early climate change discussion — as a dual seed of doubt, and questioning is planted not only into the author’s mind but also in the minds of the readers of the article as well (Unknown, *The Star*, 9 May 1925). Nevertheless, the facet of both natural and anthropogenic climate change was short lived. The author continued to direct questions on the underlying reasons as to why ‘climate change’ was occurring towards scientists, experts, and institutions that were more transfixed with explaining current, including knowledge gaps, and new research — essentially their plans on how to fill in those knowledge gaps, at that time pertaining to weather, their support for theories on the local-global weather nexus, and climate change variability, such as solar variability.

The facet of natural climate change, its underlying terminology of solar variability, and its dominant process(es) — a resulting increase in natural disasters — all emerged at the end of 1925 in a single article titled “A Time of Storms”:

> “It may seem a mere assumption that there is any relation between what is happening in Britain [worst blizzard experienced in many years] and the wild weather along our coasts and the acute electrical conditions inland which have resulted in almost daily records of loss of life and property by lightning, hail and wind; yet there have been many previous occasions on which we have called attention to the way in which unusual conditions in one part of the world have been reflected in others—not necessarily in the way of similar conditions, but of abnormal happenings of one kind or another. … It has been rendered more interesting than ever by the claims made by the Smithsonian Institute observer, referred to a week ago [this article was not located in the archive], that the main factor in weather conditions is the amount of heat from the sun, which of course, affects the whole of the globe and which, as it only produces the full effect in the course of a period of months, gives a more solid basis for weather forecasting than has yet been available” (Unknown, *The Star*, 1 December 1925).

To summarise, the author questions whether global weather is interconnected, local-global weather nexus, and if solar variability, an increase in sunspot activity sourced from the Smithsonian Institute, was to blame for disastrous weather phenomena taking place globally in that year (Unknown, *The Star*, 1 December 1925).

“The Weather”, as previously discussed in part marked the first article to discuss a change in temperature as the overarching terminology and subsequently an increase in temperature — (Unknown, *The Star*, 7 January 1926). Conversely, an anomalous example of an article that discussed a decrease in temperature is the article titled “Frost Does Damage in the City” (Unknown, *The Star*, 23 July 1926). “Frost Does Damage in the City” manages to separate itself from the dominant narratives of the time, including past and future for the time period 1906-1955, as it is the only article where it’s dominant process(es) is that of a decrease in temperature (Unknown, *The Star*, 23 July 1926). The article covers the damage, burst pipes, frozen glass milk bottles, car accidents and so forth, caused by a particular cold snap that occurred over the city of Johannesburg and it’s surrounding areas on the 23rd of July 1926, resulting in Johannesburg experiencing it’s coldest minimum temperature recorded in

history for that time of year (20.8°F [-6.2°C]) (Unknown, *The Star*, 23 July 1926). The previous four coldest recorded minimum temperatures for Johannesburg occurred on the 27th of June 1922 (22.8°F/-5.1°C), 16th of July 1906 (23.1°F/-4.9°C), 30th of May 1918 (24.9°F/-3.9°C), and the 27th of June 1911 (25°F/-3.9°C) (Unknown, *The Star*, 23 July 1926). The author continues by writing about 'climate change', a decrease in rainfall, but focuses more on the impacts, and the record breaking minimum temperature itself, so the dominant process(es) written about is that of a decrease in temperature (Unknown, *The Star*, 23 July 1926). Interestingly, the author is confronted with a paradox whereby they need to write about the current record minimum temperature but also to incorporate the popularised narrative of that time: that a decrease in rainfall was possibly due to solar variability. Fortunately, for the author, an official at the Union Observatory summarised this dilemma: "Johannesburg is always breaking weather records. … You never can tell what it is going to do next" (Unknown, *The Star*, 23 July 1926).

Another significant article, the first and only to write about the early theories concerning what is known today as the El Niño Southern Oscillation, ENSO anomaly is titled "Strange Weather of 1931" (Unknown, *The Star*, 11 June 1934). Ironically, even though the author essentially explains the workings of 'ENSO', and argues that it could result in an increase in natural disasters, the author neglects to reference any scientific sources (Unknown, *The Star*, 11 June 1934). The author relies rather on solely referencing two experts, Pres. Roosevelt and Commander Byrd, and the institution of the National Guard to add conviction to the severity of the impacts caused by natural disasters taking place globally at that time, inferred as possibly due to 'a periodic change of ocean currents' — ENSO anomaly:

> "While South Africa—and, what was more remarkable, South-West Africa, with its desert tracts—were being deluged, England was parched by what proved, for a country accustomed to consistent rains, a most serious drought, creating problems of water supply which have not yet been solved. Canada and the northern part of the United States had a winter which at some points was the most severe known, whereas in the Antarctic unusually early warm weather resulted in a terrible break-up of the ice, accompanied by wild weather, which ruined the chances of the Ellsworth expedition and all but involved Commander Byrd's ships in

> disaster. … Ordinarily a cold current which travels all the way from the Antarctic flows along the south-west coast of Africa, with the result that no moisture rises from the ocean to be precipitated inland as rain. For West Africa—Guinea, the Gold Coast and Lower Nigeria—the conditions are reversed. Hot equatorial currents strike the land, creating the perpetually steamy atmosphere and causing the tropical rains which determine the climate there and, in a [less] degree, in the Congo area farther south. There seems to be a periodic change, the warm current pushing the cold one back at times, and visa versa. In 1933-4, it would seem, the warm current gained the upper hand altogether, pushing its way the best part of a thousand miles farther south and the desert coast and its hinterland for the time being shared the West African humidity. This remarkable theory seems worth close scientific attention and, if possible, amplification" (Unknown, *The Star*, 11 June 1934).

The last prime example of an articles core subject matter is the article titled "63-Year-Old Rainfall Records for New Bethesda Analysed", an opinion or column piece, which was written by A.G Erlank of New Bethesda, Eastern Cape (10 January 1949) and is the only article to cover the facet of anthropogenic climate change. In "63-Year-Old Rainfall Records for New Bethesda Analysed", Erlank, a "Farmer reader", writes about their 63-year-old collection of rainfall data for New Bethesda, by firstly comparing three periods of rainfall:

> "**The Bethesda of 1948 is definitely not the Bethesda of 1886 anymore**. … For the 16 years 1886 to 1901, an annual average of 17 inches. [431.8mm] and a daily average of .55 inch. [14mm] For 26 years 1902 to 1927, 11 inches [279.4mm] and .30 inch respectively [7.6mm]. For the 21 years 1928 to 1948, 14 inches [355.6mm] and .38 inch. [9.7mm]. And for the whole period of 63 years, from 1886 to 1948 an annual average of 14 inches [355.6mm] and a daily average of .41 inch. [10.4mm] … The first period is a meteorological factor, which I dare not [touch] upon. With a maximum fall of 25 inches [635mm] in 1890 and the highest daily average of .86 inch [21.8mm] in 1900, to drop down from 22 inches [558.8mm] in 1900 to only 3 inches [76.2mm] in 1903 and a daily average

> of .21 inch [5.33mm] in 1905, I can offer no explanation" (*The Graaff-Reinet Advertiser*, 10 January 1949).

Interestingly, unperturbed by the findings of their previous rainfall comparison, Erlank argues that a decrease in current rainfall has directly impacted the water levels of streams and rivers, and indirectly the wildlife of New Bethesda:

> "Seventy and sixty years ago Bethesda boasted [of the] Gats River, that was running continuously from January to December, with Hippo Pools, (*seeoegate* [Afrikaans translation of Hippo pools]) dotted along its bed. To-day, one hears of Hippo Pools only in the Kruger National Park. At that time numerous perennial springs around and above the village, were the joy and pleasure resorts of both man and beast. … Where is the stream of water about five times or more the volume of our present supply, that only ran down the Varksloot, with its rank vegetation, and the home of otters, duikers and other fauna?" (*The Graaff-Reinet Advertiser*, 10 January 1949).

Erlank makes reference to two ordinary citizens of unknown origin, Walter Rubidge and Oscar Evans, who both proposed that New Bethesda's water sources needed to be stored, dammed up, so as to provide an adequate and continuous supply of water to the area (*The Graaff-Reinet Advertiser*, 10 January 1949). Furthermore, Erlank argues that a change in seasonality had occurred: "Why do we miss our usual seasonable rains of April and September? Why no more snowstorms in winter?" (*The Graaff-Reinet Advertiser*, 10 January 1949). Erlank argues that deforestation, poor water management and overstocking are the underlying causes for the decrease in rainfall or rather a perceived decrease in rainfall, at least for the then current period, 1928-1948, yearly average rainfall in comparison to 1886-1948 yearly average rainfall:

> "No, instead of damming up a *sloot* [a ditch for irrigation], we erected a windmill, and lowered the underground water level. Instead of saving and reserving pasture, we overstocked, and tramped more footpaths, which in a short while developed into deep dangerous *dongas* [gullies], destroying vegetation, that kept the rain from draining away along the *dongas*, as fast

> as it falls, leaving the surface dry, parched and barren, with no moisture in it to draw the moisture out of the air, by way of soil-enriching and fountains feeding snowstorms of years ago. **We were all criminally selfish. We lived for the day, and for ourselves only, not thinking of our children and posterity, and of generations to come**" (*The Graaff-Reinet Advertiser*, 10 January 1949).

In sum, Erlank's arguments that anthropogenic activities, such as deforestation, and, especially, poor water management are the underlying causes for a perceived decrease in current rainfall provides an in-depth point of view from an ordinary citizen that is argued to have been overlooked by other scientists and experts in such an explicit and philosophical format.

Lastly, when comparing the time of publication of all the articles analysed (Figure 5.3.1) and the climate forcings previously discussed in Chapter 2: Literature Review, such as sun cycles, ENSO and quasi-decadal cycles, no correlation could be made other than regardless of wet or dry cycles, El Niño, La Niña or sun cycles articles were still published and that social actors such as Prof. Schwarz and journalists were the main drivers of early climate change reporting.

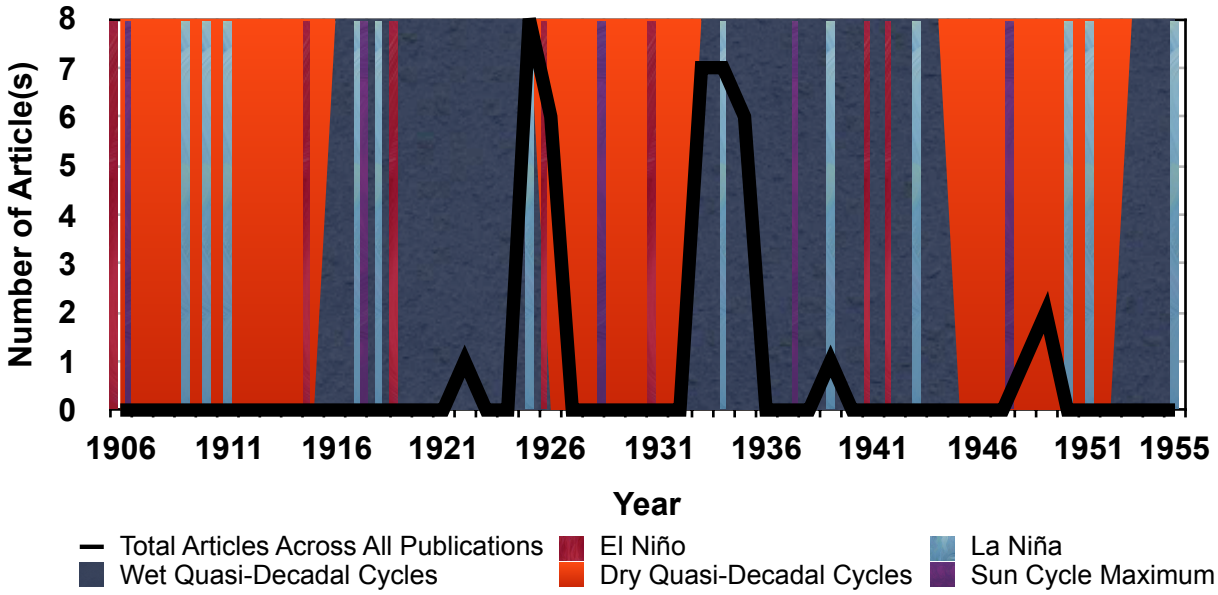


Figure 5.3.1: Number of Article(s) Per Year and Weather and Climate Variability Trends

5.4 Framing

As a reminder, each article is put through a stringent coding process whereby questions relating to five different frames; uncertainty, risk, opportunity, adaptation and mitigation initiatives, and developing versus developed, are asked for, before finally all data are then colligated into determining what the dominant frame of the article is. While articles can contain multiple frames, in their headlines and various paragraphs, it is important to note that for ease of understanding the overall dominant frame, as the name suggests, that outweighs the other frames (Table 5.4.5 SP). Therefore, in combination with the aforementioned argument, and due to the extent of figures and tables used, and limited pages, figures and tables for this Subsection will be relocated to a supplementary reader. For simplicity, figures, and tables that are denoted with SP can be located in the supplementary reader.

Beginning with the extrapolated uncertainty frame data: (i) 29 articles mention uncertainties about climate change science and/or early climate change, including future projections, (ii) 25 articles also contained words such as: ‘increasingly uncertain’, ‘almost certain’ or ‘record breaking’ when referring to climate science/early climate change, including future projections, (iii) 22 articles included uncertainty parameters or ranges in projections, (iv) 5 articles made mention of the shortcomings of statistically based projections, (v) 32 articles mentioned the ‘extension of problem’ domain, and that more research was needed, and lastly (vi) 8 articles had a presence of ‘duelling experts’ suggesting contestation about some aspect of climate change science (Table 5.4.1 SP). The high number articles for points i-iii and v, specifically highlights the aforementioned knowledge gaps and lack of definitive scientific consensuses and opposing publicly held climate change consensus. Furthermore, to elaborate on the 5 articles that mentioned shortcomings of statistically based projections (iv), the article titled “Scientists and Weather “Prophets” Disagree”, which will be used as an example, whereby the author mentions the shortcoming of shorter temporal scale early climate change findings and supplements these with a review on Sir Napier Shaw’s findings on climate change dating back to 79 A.D (Unknown, *The Star*, 14 January 1939) First and foremost, “Scientists and Weather “Prophets” Disagree” is the first of its kind for *The Star* to mention ‘climate change’ by a term — with one of the three subheadings reading: “Evidence Inconclusive of Climatic Changes” (Unknown, *The Star*, 14 January 1939). The author proclaims, in the first paragraph:

> "Weather conditions are providing meteorologists in South Africa with a baffling problem. Weather forecasting seems to be becoming much more difficult. The problem—if it is a problem—is not confined to South Africa alone for the news cables recently have been full of 'unusual weather' stories" (Unknown, *The Star*, 14 January 1939).

The author then elaborates on the "unusual weather stories", and thereafter speaks of the "popular theory" behind 'climate change', knowledge gaps in climate science, and the latest climate change research findings, all the whilst ironically continuously shifting their view throughout the article on the idea that climate change could potentially be occurring. Due to said article essentially offering the fullest description on early climate change, excluding the anthropogenic facet — as this facet can be extrapolated to not have been fully understood for discussion at the time, the main arguments will be provided as an extract:

> "Great Britain had a bitterly cold Christmas. On the other hand extremely high temperatures were registered in the spring of 1938, especially in March. Australia is sweltering in a heat wave, and accounts have been seen sent of disastrous bush fires in the 'outback' areas. A little while ago it was reported that the ice-cap on Kilimanjaro, the highest mountain in Africa, situated in Tanganyika, was shrinking. … Last month when Johannesburg shivered in an unexpected cold snap people were inclined to say that the climate was changing. Everyone had forgotten that precisely similar weather occurred in Johannesburg in 1904-5 [albeit 34 years ago]. People's memories, and indeed existing records, are short. … The popular theory throughout the world at present is to link weather with the incidence of sunspots; but, in fact, scientists have been reluctant to draw any conclusion from events which, over a comparatively short period, seem to have some harmony with changes in the solar cycle. … Direct correlation of sun-spots with any weather phenomenon, it is felt, is impossible from a scientific point of view. … Authorities at the Rand University [possibly The University of the Witwatersrand today] feel that no scientific conclusion can be drawn from present conditions in their relationship to other recorded conditions, principally because the period

over which proper observations have been taken is too short. That there have been changes in climate on the surface of the globe is clear—at one period the whole of Southern Africa was covered by an ice-sheet—but the change is imperceptibly slow. Man, however, has always felt that the climate was changing, and psychology has to be brought into the problem, as well as history. … Brunt's [Professor D. Brunt] analysis of London temperatures going back as far as 1770 and leading to the present day, shows no particular trend. An analysis on a lesser scale, that dealing with the temperature of Bloemfontein, also failed to reveal any [specific] trend over the period for which observations were recorded[.] Meteorologists have tried to find climatic trends in weather phenomena in South Africa, but thus far nothing has eventuated. … Sir Napier Shaw, former director of the Meteorological Office in London, compiled a chart giving historical evidence of climatic changes between the 11th and 19th centuries. It is interesting to note from these data that cold winters often follow volcanic eruptions. Sir Napier Shaw's chart gives the following data:—

1698-1699	The coldest years between 1965 and 1742: the latest spring for the past 47 years. Apples in bloom July 30. The first wheat cut in middle September and much barley uncut at Christmas, and in Scotland corn was reaped in January 1699. The price of wheat was more than doubled.
1697	Much rain and hail.
1696	Crops bad and dear.
1665	Cool summer.
1694-1695	Severe frost, many forest trees split. Eruptions at Celebes, Amboyna, Guninge Apl 1694 [Sulawesi island, Indonesia]
1638-1684	Great frost from beginning of December to February 4. Longest frost on record, nearly all birds perished. Very severe weather in Dorsetshire about Christmas.
1681	Severe drought and cold spring. Eruption at Celebes, 1680.
1671	An ice storm, December 9, 19, 11, followed by great heat.
1661	Great Indian famine, no rain for two years.
1660	Very cold. The price of wheat doubled.
1649	Great frost in January. The Thames frozen over.
1648	Very wet summer.
1637	Long, severe winter. Eruption at Hecla, 1636 [also known as Hekla, Iceland].
1632-1633	Severe autumn, winter and spring in Europe. Hot dry, summer in Italy. Vesuvius more violent than at any other time since '79

1622	Frost. All the rivers of Europe frozen and also the Zuyder Zee.
1616	Great drought at Nottingham,
1607-1608	Great frost and snow from December 5 to February 14. Rivers frozen, including the Ouse at York, and the Thames at Lambeth.

> … In another part of the same chart Sir Napier gave data dealing with climatic phenomena before 1,000 A.D. Notable frosts were assigned to the years 998, 987, 923, 908, 874, 827, 806, 736, 695, 545, 508, 358, 320, 231, 230, 220. In 944 there was a great gale.
>
> Other features were:—

836	Flood.
800	A violent wind and heavy sea on December 24.
763	Drought.
761	Severe winter.
738	Flood.
721	Hot summer.
353	Flood.
80	Severe drought period for several years in middle Asia.
79	Destruction of Pompeii by eruption of Vesuvius.

> Even with all this, there is no clear evidence of trend, or even of periodicity. Be this as it may, however, there is a general tendency among people of all kinds to believe that the temperature of the earth's surface is rising. Especially is this belief manifest in England, where the warmest March for 70 years was experienced in 1938. Scientific minds in Johannesburg will go no further than admit that it is raining, or that it is fine. They refuse to draw any conclusions or deductions from what they feel are inadequate data" (Unknown, *The Star*, 14 January 1939).

In review of extracted article, the author provides an in-depth discussion on a complete overview of early climate change for that time, including knowledge gaps, data restrictions, and even new-found disbelief on previously scientific consensus

held territory, such as on sunspots located therein (Unknown, *The Star*, 14 January 1939). Moreover, the article represents a significant shift in scientific consensus, as the local-global weather nexus is no longer seen, as evident in earlier articles, as the obstacle in the development of climate change science, but rather the timeline in which climate change is occurring, and to what degree it's impacts are taking place (Unknown, *The Star*, 14 January 1939). This is evident in Professor D. Brunt's statements:

> "… "Climate has changed considerably from time to time in the past, though we cannot say with any degree of certainty how rapidly the change has occurred. There is no reason for supposing that we live in an age distinguished by having a climate which is fixed and unchanging: but we want to know whether the time necessary for an appreciable change is 10,000 or 1,000 years. The changes of mean temperature from year to year are so uncertain that nothing definite can be deduced from them. In any case reliable observation of temperature and rainfall are available only for the past 170 years or so"" (Unknown, *The Star*, 14 January 1939).

Secondly, for the risk frame: (i) 18 articles included general unsourced statements mentioning risks, broadly defined as possible adverse impacts or consequences from, for example, warmer temperatures, (ii) a further 14 articles included named sourced statements from scientists, experts and/or scientific reports mentioning risk, and (iii) 19 articles included statements, either sourced or unsourced, mentioning risks more explicitly, either by the use of the word 'risk', 'precaution', 'threatens' or 'insurance', or where the odds, probabilities or chance of something adverse happening are given. Lastly, for the risk frame the following was extrapolated: (iv), whether or not an article included more information on scientific aspects, consequences or knowledge gaps from, for example, warmer temperatures, future predictions, compared to societal impacts or consequences; 15 articles included the scientific aspects, 7 included the societal consequences, 14 included both the scientific and societal aspects, 2 articles making no clear distinction between scientific and societal consequences with the remaining article falling into the other category (Table 5.4.2 SP). The latter article, previously discussed, is rather on the criticism of Professor Schwarz's Kalahari Scheme, ""Thirstland" Redemption" including his climate change theories (Unknown, *The Star*, 25 April 1925b).

Third, the opportunity frame: (i) no article included statements, either sourced or unsourced, mentioning opportunities and/or possible positive benefits for the continuation of the burning of fossil fuels, and (ii) no article included statements, either sourced or unsourced, mentioning opportunities and/or possible positive impacts from climate change, for example, warmer temperatures resulting in melting glaciers where new arable land would be available. It is argued that the reason for no articles making use of the opportunity frame is due to corporate and even state sponsored climate denialism, as discussed in the Literature Review, or its genesis in the form of pollution, either not being well documented by the media or it had just not taken place at all, the plethora of knowledge gaps. Nevertheless, political interference was found to have existed which will be discussed in detail later in this subsection.

For the adaptation and mitigation initiatives frame it was found that: (i) 21 articles included statements, either sourced or unsourced, referring to adaptation and mitigation initiatives as a benefit, (ii) of the 21 articles, 17 mentioned both economic and societal benefits, while the remaining 4 articles made no clear distinction on whether it was economic and/or a societal benefit, and (iii) 12 of the 21 articles included named sourced statements from scientists, experts and/or scientific reports mentioning opportunities and/or possible positive outcomes in essentially addressing climate change (Table 5.4.3 SP). The primary driver of the high number of articles containing the adaptation and mitigation initiatives frame was Prof. Schwarz's Kalahari scheme followed by the American afforestation plan, previously discussed.

Finally, the developing versus the developed frame: (i) 24 articles included statements, either sourced or unsourced, referring to 'climate change' as a global problem, with the remaining 15 articles making no clear distinction between 'climate change' as being a global and/or a local problem, (ii) all 39 articles made no clear distinction when referring to 'climate change' as something only developed nations should address (Table 5.4.4 SP). These results identify that the knowledge gaps, especially evident in local-global weather nexus, played some part in resulting in 15 articles making no clear distinction between 'climate change' as being a global and/or a local problem. Furthermore, the authors of the 24 articles that did distinctly classify early climate change as a global problem was mainly due to global weather and climate variability forcings such as solar variability and large scale natural disasters

being the subject matter covered. Lastly, a narrative theme of contemporary climate change whereby developing nations, usually nations that emit lower GHGs such as Ghana and are still developing even including a high polluting developing nation such as China argue that higher emitting developed nations such as the USA or UK should be more responsible in addressing climate change by means of financing mitigation and adaptation initiatives, was not presented in the articles.

Shifting the discussion to the dominant frame used in the articles, when analysing the articles, four questions are posed for each section of an article — heading, first paragraph, conclusion, and the accompanying graphic(s) — to better understand the frame used, and therein the structure and theme. Firstly, the frame emanating from each headline, of each of the 39 articles was found to be the following: 14 expressed uncertainty, 13 expressed risk (5 of which were explicit, with the remaining 8 being implicit), 8 expressed adaptation and mitigation initiatives and 4 expressed an uncategorisable frame, ‘other’ (Table 5.4.5 SP). An example of an uncategorisable ‘other’ frame is the article titled “Readers’ Po..” where the title the article’s full title was pasted over by another article in the SAWS archive (Moore, *The Rand Daily Mail*, 16 October 1933). Another reason is that some headlines contain more than one frame, for example, the series titled “The Kalahari and Our Climate [Pt. 1 & 2]” could be read as containing both the uncertainty and certainty frame (*The Sunday Times*, 2 September 1934; *The Sunday Times*, 9 September 1934). The results highlight that the uncertainty frame, closely followed by risk, explicit risk to be precise, dominated early climate change headlines and was purposefully used to garner reader attention, examples include: “Strange Weather of 1931” and “The Drought Menace” (Unknown, *The Star*, 11 June 1934; Unknown, *The Rand Daily Mail*, 9 January 1935a).

Secondly, the dominant frame found to be used for the first paragraph, an average of the first six lines, was as follows: 15 paragraphs contained the uncertainty frame, followed by 10 containing risk (6 explicit and the 4 implicit), 5 articles contained the adaptation and mitigation initiatives frame, and 9 were categorised under the other category (Table 5.4.5 SP). The main driver for the 9 articles being categorised under the ‘other category’ are articles where the paragraphs subject matter was not connected to early climate change whatsoever or the subject matter contained more than one frame. To elaborate on the latter three falling under the other category; ““Thirstland” Redemption”, falls under the ‘other’ category as the first paragraph

introduces Dr. Sutton and contains their criticism of the Kalahari scheme, essentially containing the certainty frame (Unknown, *The Star,* 25 April 1925b). Following ““Thirstland” Redemption”, the next article’s, “The Hurricane Month”, ‘other’ paragraph contained the narration of a Hindi, and Saints' Day festival being carried out in Mauritius, in the backdrop of destruction, and death after a cyclone impacted the island — with the impacts only being discussed from the second paragraph onwards (Unknown, *The Star*, 25 April 1926). While the third and final article’s first ‘other’ paragraph, “Frost Does Damage in the City”, writes of “Unprecedented conditions experienced”, as a result of Johannesburg experiencing one of the coldest days, the 23rd of July 1926, in its history with a minimum of -6.2°C — which was only further expanded upon after the first paragraph, and the hardships facing residents and businesses, including how the cold hampered *The Star*’s printing processes, and deliveries due to burst pipes (Unknown, *The Star*, 23 July 1926). The dominance of the uncertainty frame used in the first paragraph is argued to be due to authors first setting the context in which they would continue to write about early climate change, such as knowledge gaps, consensus debates and the local-global weather nexus among others, which will also be discussed further later in this subsection.

Thirdly, when analysing the frames contained in the concluding paragraphs of the articles, an average of the last six lines, the dominant frame was found to be as follows: 14 ended with the adaptation and mitigation initiatives frame, 10 contained risk (5 explicitly and 5 implicitly), 9 contained uncertainty, and the remaining 6 falling under the ‘other’ category (Table 5.4.5 SP). To expand on the latter four articles falling under the other category: the first article, titled “Sun and Weather”, was concluded by mentioning remarks made by British astronomers that praised Dr. C.G Abbott for campaigning for the establishment of a solar observatory in Australia (Unknown, *The Star*, 16 January 1926). In the second article’s concluding paragraph the author wrote of the impacts of the current cold spell taking place, at that time, in Aliwal North: “… the lowest temperature here for 10 years.” (Unknown, *The Star*, 23 July 1926). The third and fourth article’s concluding paragraph, titled “Strange Weather of 1931”, and “Scientists and Weather “Prophets” Disagree” (Unknown, *The Star*, 11 June 1934; Unknown, *The Star*, 14 January 1939), actually contained the certainty frame. For example, on the one hand, in “Strange Weather of 1931” the author concludes the article by discussing the scientific consensus on what was the early concept of ENSO anomaly, ‘a periodic change of ocean currents’ (Unknown,

The Star, 11 June 1934). On the other hand, for example, in “Scientists and Weather “Prophets” Disagree” — consensus on early climate change was discussed: “… Scientific opinion in Johannesburg is that the present weather, though it may appear a little unusual, is in fact not unusual at all. It seems clear, at any rate, that the recent excess of rainfall and incidence of unusual temperatures are no more remarkable than similar occurrences during the past 15 or 20 years.” (Unknown, *The Star*, 14 January 1939). The dominance in the use of the adaptation and mitigation frame in the concluding paragraphs highlights that authors would try to counteract the uncertainty and risk frame present in their articles, especially in the first paragraph as was found to be dominated by the uncertainty frame.

Lastly, the overall dominant framing used in each article, as a whole, was as follows: 15 of the 39 articles’, the majority, dominant frame was of uncertainty, followed by 12 falling under the adaptation and mitigation initiatives frame, 11 under risk, and one that fell under the ‘other’ frame (Table 5.4.5 SP). The latter article, previously discussed, is rather on the criticism of Professor Schwarz’s Kalahari scheme, ““Thirstland” Redemption”, which indicated certainty pertaining to scientific climate change consensus rather than uncertainty as the dominant frame (Unknown, *The Star*, 25 April 1925b). The defining underpinning reason for the overall dominant framing of articles was closely related to the subject matter covered by each article and its framing by its author across headlines, sub-headlines and from the first paragraphs to the concluding paragraphs. In sum, the use of the uncertainty frame as the overall dominant frame again highlights that knowledge gaps, consensus debates and the local-global weather nexus all influenced this result.

From all the framing results and substantial interaction with each article, it can be deduced that aside from some knowledge gaps discussed in various examples, the local-global weather nexus is argued to have played a significant part in an author’s hesitation in writing articles on early climate change. The lack of a consensus on the local-global weather nexus ultimately casts doubt on ‘climate change’, as climate change science fundamentally relies on the local-global weather nexus to be understood as being interlinked, and therefore to have the capacity to influence one another, both naturally and later anthropogenically. Moreover, due to the lack of a consensus, an author is argued to have not been able to take a firm position through their narrative on early climate change in their article, as seen in the previous

extractions from both “The Weather” and “Waiting for the Rain”; their position becomes one of: ‘It could be true, or it could not be true, and there is no evidence at this time to suggest otherwise’ — essentially a paradox (Unknown, *The Star*, 7 January 1926; Unknown, *The Star*, 12 January 1926). Thus, the author had to first argue that the local-global weather nexus existed, or at least could exist, with what little scientific evidence they had at the time, and only once they could establish the former could they have a foundational argument for early climate change to be established upon. Furthermore, the use the local-global weather nexus article structure, most prominent in feature and reflection pieces as discussed, signals that, more likely than not, journalists played a significant role in contributing to the overall development of a consensus being reached, not only in scientific discourse where they were seen as continuously pushing for consensus from the scientific community but that they also played an integral role in shaping the consensus in view of the public. To expand on the latter, the public was made aware that the local-global weather nexus existed, or at least could exist, and that knowledge gaps existed in meteorological science on these topics, as made evident in the previous extractions from both “The Weather” and “Waiting for the Rain”, with the journalists’ conclusions highlighting what was being done to fill these knowledge gaps (Unknown, *The Star*, 7 January 1926; Unknown, *The Star*, 12 January 1926).

Another article which has to be discussed exemplifies the difficulty faced by authors in writing articles covering early climate change and how political pressure can sway opinions. The article was written by a thought-provoking unknown journalist, who wrote the article primarily as an update on the ‘drying up’ theory, aptly titled “Drying Up?” and published by *The Daily Dispatch* on 25 November 1933. The journalist makes a poignant point on early climate change reporting in general:

> “Whenever this country suffers from a drought we invariably hear the assertion that South Africa is drying up; that the seasons are changing; that the rains no longer come as they used to do in the good old days. Now that the drought has broken, however, and the weather reports tell us of floods and so-called cloudbursts, the theory that South Africa is drying up is much less frequently brought forward and will probably not appear prominently “in the news” again until the next dry spell” (Unknown, *The Daily Dispatch*, 25 November 1933).

This journalist writes of a paradoxical question which journalists still face today: ‘Do I write about climate change and how it is resulting in a decrease in rainfall during a high rainfall season, even as climate change is continuously occurring?’ The obvious and trite reason for not covering climate change impacts when the weather does not corroborate these impacts is postulated to be a fear of criticism, criticism from both the editors of the newspaper and readers, as the latter would be more interested in the minutia of current weather and not in climate change impacts which do not appear to correlate with the former. For example, some questions readers and obliging journalists answer in articles on weather, specifically on rainfall as South Africa is a water scarce country, include: how many centimetres of rainfall fell, where the rainfall fell, how full the dams are, and how emotional the farmers are after receiving or in not receiving rainfall — which has been seen as the case in hundreds of articles across various newspapers in the SAWS archive throughout this dissertations research time period of 1906-2005.

The journalist continues by writing about Dr. Schumann’s, the Chief Meteorologist of the time, research over forty years which showed a decrease of rainfall in some areas of South Africa and an increase in rainfall in others, and that “The surprising thing is that any meteorologist should attempt to draw conclusions from so brief a period as forty years, which is altogether too short a time to warrant definite deductions” (Unknown, *The Daily Dispatch*, 25 November 1933). Furthermore, the journalist compares Dr. Schumann’s findings with The Drought Commission’s findings, of 1923, which reported that “no proof was submitted that the mean annual rainfall of Africa has appreciably altered within recent historical times: nor is it considered likely that such a change has taken place” (Unknown, *The Daily Dispatch*, 25 November 1933). Interestingly, the Government backed Drought Commission and the Government assigned Chief Meteorologist disagreed on climate change, and in particular on whether a decrease in rainfall was occurring in South Africa overtime, an interesting observation. Thereafter, the journalist strikingly describes how fickle human memory is:

> “But it is human nature to place the golden age in the past. There are no pies today like those which mother used to bake. The skies were brighter, the seasons more regular, and the crops were heavier in the old days; and

> the rain came when it was needed. The schoolboy's definition of memory as "the thing you forget with" contains a vast amount of truth. Our present troubles especially always seem the worst we have known. The trials of the past lose much of their acuteness as they fade into the background and are succeeded by new ones" (Unknown, *The Daily Dispatch*, 25 November 1933).

Thus, the journalist argues that on the one hand people reminisce about good days, in the case of early climate change of good rainfall, and on the other hand people forget past trials and tribulations, such as the 'drying theory', as they are soon replaced by newer ones (Unknown, *The Daily Dispatch*, 25 November 1933). The journalist concludes by arguing that the alleged decrease in rainfall has been occurring since the time of early settlers, professed as natural, and should not be the only subject under discussion (Unknown, *The Daily Dispatch*, 25 November 1933). Rather the journalist argues that the topics that should be under discussion should be water management, water usage and soil conservation:

> "But our trouble is not that South Africa is getting a smaller rainfall than formerly, but that we are not making proper use of that rainfall. Neglect to conserve the water when it falls and neglect to guard against erosion and the wastage of water and soil caused thereby are mainly responsible for the conditions that people are apt to ascribe to the alleged drying-up of the sub-continent" (Unknown, *The Daily Dispatch*, 25 November 1933).

It must be noted that this journalist's descriptions of writing about early climate change when current weather does not corroborate the impacts of climate change, and about human memory on such a profound topic as early climate change provides a deeper appreciation of the thought and decision processes involved in writing about early climate change and of just how difficult this is.

5.5 Quotes and Indicators of Mainstream Consensus Versus Sceptical Voices

Of interest are the emotional responses by authors, scientists and experts on early climate change. The most dominant emotional response was that of hope (6 responses), hope that a solution, such as the Kalahari scheme, would end the publicly held consensus that a progressive decrease in rainfall and return it back to

normal. Following hope as an emotional response was worry (3 responses), fear, shame and shock (all three emotions were expressed once each) (Table 5.5.1.1). The response of shock emanated from Dr. Schumann, who backtracked on his support of the ‘farmer’s’ view that South Africa was drying up. This emotional response by Dr. Schumann exemplifies the difficulty meteorological officials and other members of the scientific and governmental community faced in supporting the ‘drying up theory’, even with their own evidence that suggested that South Africa was indeed drying up. Dr. Schumann’s reversal of support is also argued as political interference, to be discussed in detail later in this Subsection. Lastly, in terms of the sceptical voices, 23 articles contained sceptical voices which gave context on where the dominant scientific consensus lies — that consensus surrounding global weather and climate and whether they could be interlinked, local-global weather nexus, as well as the South African scientific community being against civil society’s view that South Africa was drying up (Table 5.5.1.2). The local-global weather nexus differs from American early climate change reporting, Chapter 2: Literature Review, specifically in that American newspapers reported on weather and climate linkages with food security (Boykoff, 2011). It is also important to note that 13 of these articles that contained sceptical voices were in fact the authors of these 13 articles themselves. These authors are argued to have played a dual role in their articles as both for and against the ‘drying up theory’. These dual roles were undertaken by authors to provide not only a holistic view from both opposing sides on the debate, but to also mask their own views on the topic and avoid coming across as a supporter for either side.

Table 5.5.1.1: Direct Quotes

Article Title and Year	Are there direct quotes of named scientist(s)/expert(s) or scientific report(s) which predominantly contain: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) —And number of quotes?	If direct quote(s) contains 'risk', are the majority of the quotes i) implicit or ii) explicit?	Are there direct quotes from scientist(s) or expert(s) where they talk of their emotional response?	If yes for previous question, what is the quoted scientist(s) or expert(s) dominant emotion? a) Fear b) Worry c) Sadness d) Shock e) Surprise f) Other (specify)
Advance of the Desert (26 August 1922)	d) Adaptation and mitigation (majority of the interview with Prof. Schwarz contains adaptation and mitigation statements)	N/A	Yes	f) Other (hope)
The 1924 Rainfall (6 January 1925)	f) Other (none)	N/A	N/A	N/A
Kalahari Scheme (8 Apr 1925)	d) Adaptation and mitigation (7 quotes)	N/A	No	N/A
The Kalahari Scheme (25 Apr 1925a)	d) Adaptation and mitigation (Interview with Prof. Schwarz—4 quotes)	N/A	Yes	f) Other (hope/ belief)
"Thirstland" redemption (25 Apr 1925b)	f) Other (article criticised Schwarz's theory—2 quotes)	N/A	No	N/A
Correspondence (After 25 April 1925)	f) Other (none)	N/A	N/A	N/A
Wet and dry (5 May 1925)	f) Other (none)	N/A	No	N/A
Secrets of the weather (9 May 1925)	a) Uncertainty (5 quotes)	N/A	Yes	b) Worry (Dr. Sutton, and sea captains)
A time of storms (1 Dec 1925)	a) Uncertainty (0 quotes opinion column)	N/A	No	N/A
The Weather (7 Jan 1926)	a) Uncertainty (0 quotes reflection column)	N/A	No	N/A
Waiting for the rain (12 Jan 26)	a) Uncertainty (0 quotes reflection column)	N/A	No	N/A
Sun and weather (16 Jan 26)	a) Uncertainty (80% is Dr. Abbott's speech; 4 quotes directly on uncertainty)	N/A	Yes	f) Other (Dr. Abbott, shame)
The hurricane month (25 Apr 1926)	f) Other (none)	N/A	No	N/A
Frost does damage in the city (23 Jul 1926)	a) Uncertainty (2 quotes)	N/A	No	N/A
A cyclone year (10 Nov 1926)	b) Risk (4 quotes)	i) Implicit	No	N/A
Strange weather (11 June 1931)	f) Other (none)	N/A	No	N/A

Article Title and Year	Are there direct quotes of named scientist(s)/expert(s) or scientific report(s) which predominantly contain: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) —And number of quotes?	If direct quote(s) contains 'risk', are the majority of the quotes i) implicit or ii) explicit?	Are there direct quotes from scientist(s) or expert(s) where they talk of their emotional response?	If yes for previous question, what is the quoted scientist(s) or expert(s) dominant emotion? a) Fear b) Worry c) Sadness d) Shock e) Surprise f) Other (specify)
Readers' Po… (16 Oct 1933)	f) Other (none its a letter)	N/A	No	N/A
The Remedy for Drought (17 Oct 1933)	f) Other (none its a letter)	N/A	No	N/A
Is the Union Drying Up? (23 Nov 1933)	f) Other (no predominant quote category could be established)	N/A	No	N/A
Changed S.A. Rainfall (24 Nov 1933)	b) Risk (2)	ii) Explicit	Yes	a) Fear "These are very serious decreases … What is more, study shows that where rainfall had been decreasing its intensity had been increasing"
Drying Up? (25 November 1933)	f) Other (none)	N/A	N/A	N/A
Prophet versus expert (30 Nov 1933)	f) Other (only citizen—Mr. Saunders)	N/A	No	N/A
"Prophet versus Expert" (9 December 1933)	a) Uncertainty—as author (Dr. Schumann)	N/A	Yes	f) Other (shock)
Huge afforestation plan in America (23 Jul 1934)	f) Other (author was the dominant drivers of risk—9 quotes)	N/A	No	N/A
Effects of trees on climate (24 Jul 1934)	d) Adaptation and mitigation (4 quotes)	N/A	Yes	f) Other (hope/ belief)
Development of the Kalahari [Pt. 1] (19 August 1934)	f) Other (none)	N/A	Yes (As author, and expert)	f) Other (hope)
Development of the Kalahari [Pt. 2] (26 August 1934)	f) Other (none)	N/A	No	N/A
The Kalahari and Our Climate [Pt. 1] (2 September 1934)	f) Other (none)	N/A	No	N/A
The Kalahari and Our Climate [Pt. 2] (9 September 1934)	f) Other (none)	N/A	No	N/A
Is South Africa Drying Up? (8 Jan 1935)	b) Risk (7)	ii) Explicit	Yes	f) (other-hope)
The Drought Menace (9 Jan 1935a)	f) Other (a combination: one quote for each of the following; certainty, risk, and adaptation and mitigation initiatives)	N/A	Yes	f) (other-hope)
Not So Dry (9 Jan 1935b)	f) Other (none)	N/A	No	N/A

Article Title and Year	Are there direct quotes of named scientist(s)/expert(s) or scientific report(s) which predominantly contain: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) —And number of quotes?	If direct quote(s) contains 'risk', are the majority of the quotes i) implicit or ii) explicit?	Are there direct quotes from scientist(s) or expert(s) where they talk of their emotional response?	If yes for previous question, what is the quoted scientist(s) or expert(s) dominant emotion? a) Fear b) Worry c) Sadness d) Shock e) Surprise f) Other (specify)
The Drought Problem in South Africa [Pt. 1] (11 August 1935)	f) Other (none)	N/A	No	N/A
The Drought Problem in South Africa [Pt. 2] (18 August 1935)	b) Risk (2 by the German scientific report)	ii) Explicit	No	N/A
The Kalahari Scheme Again (18 August 1935)	b) Risk (2 by the German scientific report)	ii) Explicit	No	N/A
Scientists and weather "prophets" disagree (14 Jan 1939)	a) Uncertainty (6 quotes)	N/A	No	N/A
Rains not what they were (6 Apr 1948)	f) Other (none)	N/A	No	N/A
63-Year-Old Rainfall Records for New Bethesda Analysed (10 January 1949)	f) Other (none)	N/A	N/A	N/A
Eight Months Very Dry (10 January 1949)	f) Other (none)	N/A	N/A	N/A

Table 5.5.1.2: Mainstream consensus versus sceptical voices

Article Title and Year	Are sceptical voices included in the article which question some elements of mainstream climate science?	If Yes for previous question how do they appear? a) Sceptic as author of article b) Named sceptics c) Generic mentions ('sceptics say that…') d) Other (specify)	If Yes for initial question, are they in the headline and/or first paragraph?	If Yes for initial question are they in direct quotes?	If Yes for initial question, roughly what percentage of the article do their views represent? a) 0-10% b) 10-49% c) 50-90% d) 90-100%	If Yes for initial question, would you say that the article gives context about where the dominant scientific consensus lies?
Advance of the Desert (26 August 1922)	Yes	c) Generic mentions	No	No	a) 0-10%	Yes
The 1924 Rainfall (6 January 1925)	No	N/A	N/A	N/A	N/A	N/A

Article Title and Year	Are sceptical voices included in the article which question some elements of mainstream climate science?	If Yes for previous question how do they appear? a) Sceptic as author of article b) Named sceptics c) Generic mentions ('sceptics say that…') d) Other (specify)	If Yes for initial question, are they in the headline and/or first paragraph?	If Yes for initial question are they in direct quotes?	If Yes for initial question, roughly what percentage of the article do their views represent? a) 0-10% b) 10-49% c) 50-90% d) 90-100%	If Yes for initial question, would you say that the article gives context about where the dominant scientific consensus lies?
Kalahari Scheme (8 Apr 1925)	Yes	b) Named sceptics	No	No	b) 10-49%	Yes
The Kalahari Scheme (24 Apr 1925a)	No	N/A	N/A	N/A	N/A	N/A
"Thirstland" redemption (25 Apr 1925b)	Yes	d) Prof. Schwarz is the sceptic	Yes	No	c) 50-90%	Yes
Correspondence (After 25 April 1925)	Yes	b) Named Skeptics	Yes	No	a) 0-10%	Yes
Wet and dry (5 May 1925)	No	N/A	N/A	N/A	N/A	N/A
Secrets of the weather (9 May 1925)	Yes	b) Named sceptics	No	Yes	b) 10-49%	Yes
A time of storms (1 Dec 1925)	No	N/A	N/A	N/A	N/A	N/A
The Weather (7 Jan 1926)	No	N/A	N/A	N/A	N/A	N/A
Waiting for the rain (12 Jan 26)	No	N/A	N/A	N/A	N/A	N/A
Sun and weather (16 Jan 26)	Yes	b) Named sceptics	No	No	a) 0-10%	Yes
The hurricane month (25 Apr 1926)	No	N/A	N/A	N/A	N/A	N/A
Frost does damage in the city (23 Jul 1926)	No	N/A	N/A	N/A	N/A	N/A
A cyclone year (10 Nov 1926)	No	N/A	N/A	N/A	N/A	N/A
Readers' Po… (16 Oct 1933)	No	N/A (Critical of Gov. Not Science)	N/A	N/A	N/A	N/A
The Remedy for Drought (17 Oct 1933)	No	N/A (Critical of Gov. Not Science)	N/A	N/A	N/A	N/A
Is the Union Drying Up? (23 Nov 1933)	Yes	a) Sceptic as author (author criticizes other 'scientists' for not supporting the notion that South Africa was drying up)	Yes	Yes (as author)	c) 50-90%	Yes

Article Title and Year	Are sceptical voices included in the article which question some elements of mainstream climate science?	If Yes for previous question how do they appear? a) Sceptic as author of article b) Named sceptics c) Generic mentions ('sceptics say that…') d) Other (specify)	If Yes for initial question, are they in the headline and/or first paragraph?	If Yes for initial question are they in direct quotes?	If Yes for initial question, roughly what percentage of the article do their views represent? a) 0-10% b) 10-49% c) 50-90% d) 90-100%	If Yes for initial question, would you say that the article gives context about where the dominant scientific consensus lies?
Changed S.A. Rainfall (24 Nov 1933)	Yes	b) Named sceptics	No	No	a) 0-10%	Yes
Drying Up? (25 November 1933)	Yes	a) Sceptic as author of article	Yes	Yes	c) 50-90%	Yes
Prophet versus expert (30 Nov 1933)	Yes	a) Sceptic as author	Yes	Yes (as author)	c) 50-90%	Yes
"Prophet versus Expert" (9 December 1933)	Yes	a) Sceptic as author	Yes	Yes (as author)	c) 50-90%	Yes
Strange weather (11 June 1934)	No	N/A	N/A	N/A	N/A	N/A
Huge afforestation plan in America (23 Jul 1934)	No	N/A	N/A	N/A	N/A	N/A
Effects of trees on climate (24 Jul 1934)	No	N/A	N/A	N/A	N/A	N/A
Development of the Kalahari [Pt. 1] (19 August 1934)	Yes	c) Generic mentions	No	No	b) 10-49%	Yes
Development of the Kalahari [Pt. 2] (26 August 1934)	Yes	c) Generic mentions	No	No	b) 10-49%	Yes
The Kalahari and Our Climate [Pt. 1] (2 September 1934)	Yes	a) Sceptic as author(s) of article	No	Yes (as author)	b) 10-49%	Yes
The Kalahari and Our Climate [Pt. 2] (9 September 1934)	Yes	a) Sceptic as author(s) of article	Yes	Yes (as author)	b) 10-49%	Yes
Is South Africa Drying Up? (8 Jan 1935)	Yes	b) Named sceptics	No	Yes	b) 10-49%	Yes
The Drought Menace (9 Jan 1935a)	No	a) Sceptic as Author	No	N/A	a) 0-10%	Yes
Not So Dry (9 Jan 1935b)	Yes	a) Sceptic as author (Highly critical of scientists)	Yes	Yes (as author)	d) 90-100%	Yes
The Drought Problem in South Africa [Pt. 1] (11 August 1935)	Yes	a) Sceptic as author(s) of article	Yes	Yes (as author)	b) 10-49%	Yes
The Drought Problem in South Africa [Pt. 2] (18 August 1935)	Yes	a) Sceptic as author(s) of article	No	Yes (as author)	c) 50-90%	Yes

Article Title and Year	Are sceptical voices included in the article which question some elements of mainstream climate science?	If Yes for previous question how do they appear? a) Sceptic as author of article b) Named sceptics c) Generic mentions ('sceptics say that…') d) Other (specify)	If Yes for initial question, are they in the headline and/or first paragraph?	If Yes for initial question are they in direct quotes?	If Yes for initial question, roughly what percentage of the article do their views represent? a) 0-10% b) 10-49% c) 50-90% d) 90-100%	If Yes for initial question, would you say that the article gives context about where the dominant scientific consensus lies?
The Kalahari Scheme Again (18 August 1935)	Yes	a) Sceptic as author(s) of article	Yes	Yes (as author)	b) 10-49%	Yes
Scientists and weather "prophets" disagree (14 Jan 1939)	Yes	a) Sceptic as author of article	Yes	Yes	b) 10-49%	Yes
Rains not what they were (6 Apr 1948)	Yes	a) Sceptic as author of article	Yes	Yes	b) 10-49%	Yes
63-Year-Old Rainfall Records for New Bethesda Analysed (10 January 1949)	No	N/A	N/A	N/A	N/A	N/A
Eight Months Very Dry (10 January 1949)	No	N/A	N/A	N/A	N/A	N/A

To elaborate on the political interference mentioned, which in turn exemplifies the mainstream consensus and sceptical voices several articles will be discussed concerning Dr. Schumann, Chief Meteorologist of the Union of that time. In the first article, titled "Is the Union Drying Up?", the author proclaims: "Dr. T.E.W. Schumann, Chief Meteorologist of the Union disagrees with the scientists and agrees with the farmer that the rainfall of large areas in the Union has become less — at any rate during the [last] 40 years" (Unknown, *The Pretoria News*, 23 November 1933). The author continues to paraphrase Dr. Schumann's findings, that were presented to the Pretoria Rotary Club, on the subject of South African rainfall:

> "… [Dr. Schumann] displayed a map showing the relative average rainfall of the decades 1891 to 1900 and 1923 to 1932 in several districts of the Union. He found that there was a reduction during the latter period compared with the first of 17.5 per cent. along the west coast. There was a reduction in the vicinity of [Cape Town] of 8 per cent. An increase of a few per cent. was seen along the south coast. As one went further inland,

> however, it was shown that there was an undoubted reduction in rainfall, up to as much as 27.5 per cent. in the area, including Prieska, Britstown, Richmond, Colesberg, De Aar, and Kimberley. Transvaal figures were lacking, but it appeared that there was no alteration for Pretoria or Johannesburg" (Unknown, *The Pretoria News*, 23 November 1933).

Thereafter, the author then conducts an interview with Dr. Schumann, but rather than asking more in-depth questions on his research and findings, the author proposes that the Kalahari Scheme could be the answer to the reduction in rainfall (Unknown, *The Pretoria News*, 23 November 1933). To which Dr. Schumann argues that no evidence supports the methodology behind the Kalahari Scheme, to refill dried lakes, and that the dried lakes would have had no impact on changing South Africa's climate (Unknown, *The Pretoria News*, 23 November 1933). However, Dr. Schumann; "… agreed [with Professor Schwarz's Kalahari Scheme's rationale] that the rainfall had deteriorated, as was borne out by the figures he had investigated over several stations and areas in the Union" (Unknown, *The Pretoria News*, 23 November 1933). Furthermore, in said article, Dr. Schumann also argues that the Kalahari Scheme's methodology was actually the subject of an article written by Mr. H. Paulsmeier, published in the Agricultural Journal of May 1914, some years before Professor Schwarz outlined his own scheme (Unknown, *The Pretoria News*, 23 November 1933). Thereafter, "[Dr. Schumann] detailed the various influences which affect rainfall, and referred to the volcanic eruption of two years ago [no specific location was mentioned]", Dr. Schumann also discussed the influence of topography and sunspots on rainfall, and that he believed the moon to have no influence on rainfall whatsoever (Unknown, *The Pretoria News*, 23 November 1933). The article is concluded with the minimum and maximum temperatures in Pretoria for yesterday, the 22nd of November, being 32°F and 60°F respectively, or metrically expressed as 0°C and 15.6°C (Unknown, *The Pretoria News*, 23 November 1933). The findings, and arguments, presented in "Is the Union Drying Up?" by Dr. Schumann, represents a significant shift in the 'is South Africa drying up' debate, as his findings and remarks designate the first time where not only a SAWS meteorologist, but a Chief Meteorologist and to extension a head of a governmental institution, supported the layman's, 'farmer theory' that South Africa's rainfall was decreasing (Unknown, *The Pretoria News*, 23 November 1933).

With Dr. Schumann essentially admitting that South Africa's rainfall was decreasing, made through the arguments and findings presented in "Is the Union Drying Up?", their admission was only a week later dismissed as common sense, with *The Pretoria News* author, and ironically a farmer, Mr. J. W. Saunders — who's letter was reprinted in said article — arguing that Dr. Schumann, along with other meteorologists, was 'late to the common sense party' in "Prophets Versus Expert" (Unknown, *The Pretoria News*, 30 November 1933). In "Prophets Versus Experts", the author argues: "We were cautiously prepared for the astounding yet logical conclusion of all this day reasoning: that henceforth droughts must be regarded as normal, and rains as abnormal" (Unknown, *The Pretoria News*, 30 November 1933). Perplexingly, the author then digresses by stating their disdain for the 'expert' meteorologists, including Dr. Schumann, for not being able to predict the obvious like the 'prophet', Mr. Saunders:

> "Four months ago: [a] letter appeared in the *Pretoria News*, signed by Mr. J.W. Saunders, of Springbok Flats, prophesying that we would have record rains this season. In making this prediction, he was fortified by thirty years' experience in winning a livelihood from the soil. There is a striking difference in the methods followed by official forecasters and this practical farmer; a difference which, we think, should be brought out. … [Mr. Saunders] made his prophecy last July on the strength of floods in the East, plus rains at the Cape, snow in Natal and Basutoland, and the direction of the winds. Our experts could do likewise. They should be able to tell us well in advance what seasons to expect. Present talk about the Union going dry is too puerile, even if we condone it as prophetic licence" (Unknown, *The Pretoria News*, 30 November 1933).

Even more perplexing was that instead of the author rising to the occasion, to portray the significance of what was essentially the Chief Meteorologist's supported view that 'climate change' had resulted in a decrease in South Africa's rainfall, the author rather continued the article by questioning the "Expert's", Dr. Schumann's, methodology:

> "[Dr. Schumann's] field of research is too restricted, both as to period and the area covered. Because rainfall statistics in one decade happen to be

> more favourable than those for a subsequent decade—both, apparently, chosen arbitrarily—is obviously a very thin argument for the drying-up doctrine. How do we know that earlier statistics are as reliable as the modern? At one time there were no instruments for measuring rainfall in South Africa, but it is necessary, before jumping to conclusions, to know what conditions prevailed away back into even the remote past. How can it be said, for instance, that the drought just experienced was unprecedented? There are records, in trees and stones, animal and human migrations, of climatic conditions, kept faithfully throughout the ages. And even that data is insufficient unless related to world conditions [the rest of this sentence was absent from the SAWS archive]" (Unknown, *The Pretoria News*, 30 November 1933).

Thus, the author argues that 'climatic conditions' were occurring, and also significantly argued that these 'climatic conditions' had to be seen in context as a global issue (Unknown, *The Pretoria News*, 30 November 1933). In brief, it is argued that the author of the article was in some way agitated that it took longer than expected for the weather bureau to officially 'admit' what was strongly argued by other segregated scientists, experts, and most importantly by the author, and ordinary citizens, that South Africa was 'drying up'. Moreover, the author was also equally agitated that the 'expert', Dr. Schumann and to extension the weather bureau, could profess that 'climate change' was occurring while providing daily weather forecasts, and yet was unable to predict the intermittent — seasonal forecasts (Unknown, *The Pretoria News*, 30 November 1933).

In the third and final article, ""Prophet Versus Expert"", the 'Expert', Dr. Schumann, writes a letter of reply on the aforementioned "Prophet Versus Expert" article, the letter is extracted in its entirety:

> "Sir,—A sub-leader in your issue of November 30 has only now come to my notice. There you state: "Dr. Schumann had an array of statistics all collected in South Africa, as a basis for a dissertation supporting the drying-up theory (of South Africa)". I am afraid that this statement may create a wrong impression, [in] no way did I say or indicate that South Africa is drying up. I merely compared the rainfall figures for the decade

> 1891-1900 with those of the decade 1923-1932 and showed that there was an unmistakable decrease of rainfall, especially over the inland areas, which is by no means the same as saying that a permanent drying-up process is taking place. On the other hand, it would be very rash to assert categorically that a drying-up process is not taking place. That is the point I tried to make in my address to Rotary [Pretoria Rotary Club]. Much further research will be necessary before a definite statement could be made one way or the other" (Unknown, *The Pretoria News*, 9 December 1933)

Through the letter, Dr. Schumann manages to distance himself from fully supporting the 'theory' that South Africa was drying up, for reasons that are argued to be possibly due to political pressure emanating from Government and within his own organisation, the Union Meteorological Department, also interchangeably referred to as the South African Meteorological Department/Office and known today as SAWS. The political pressure emanating from both institutions, government and the meteorological department, is postulated to be as a result of both institutions not wanting to support the Chief's view as it would put them in a rather precarious position with South Africans (Unknown, *The Pretoria News*, 9 December 1933). Furthermore, Dr. Schumann retracts his support in the form of a familiar consensus/ disagreement paradoxical narrative on early climate change seen previously: 'It could be true, or it could not be true, and there is no evidence at this time to suggest otherwise' (Unknown, *The Pretoria News*, 9 December 1933).

Another article, similar to the first concerning Dr. Schumann's presented findings to the Pretoria Rotary Club, titled "Changed S.A. Rainfall", provides more details on the findings in question, published by *The Rand Daily Mail*:

> "The theory that South Africa's rainfall is decreasing, particularly over the inland areas, was advanced by Dr. Theo. Schumann (Chief Meteorologist for the Union), in an address to members of the Pretoria Rotary Club, yesterday. Dr. Schumann's investigations also showed him that where the incidence of rainfall was decreasing its intensity was increasing" (Unknown, *The Rand Daily Mail*, 24 November 1933).

Interestingly, the author of said article, unlike the author of the article titled “Is the Union Drying Up?”, an article published by *The Pretoria News* that also covered Dr. Schumann’s presentation of the findings to the Pretoria Rotary Club, managed to extract more information from Dr. Schumann on the findings (Unknown, *The Pretoria News*, 23 November 1933). The author of “Changed S.A. Rainfall” captures Dr. Schumann arguing that “… where the incidence of rainfall was decreasing its intensity was increasing”, which incredibly is corroborated with climate change findings made in more recent times — specifically in relation to the rainfall patterns of the highveld, and eastern areas of South Africa (Unknown, *The Rand Daily Mail*, 24 November 1933; IPCC, 2013, 2014a, and 2014b). Moreover, the author of “Changed S.A. Rainfall” provides differing, and greater details of Dr. Schumann’s findings when compared to “Is the Union Drying Up?”;

> “Dr. Schumann’s investigations showed that in the west coastal areas from [Cape Town] to Namaqualand rainfall had decreased by 17.5 per cent. during 1923-32, compared with 1891-1900. In area from [Cape Town] to Swellendam the decrease had been 8 per cent. Along the Cape coast from [Cape Town] to East London rainfall had not changed but the inland areas showed substantial decreases. In two great areas embracing practically the whole of the north-west Cape rainfall had lessened by 27.5 and 22.5 per cent respectively. In the Oudtshoorn area, which was comparatively near the coast, the decrease had been only 8 per cent., but in the Free State area (with Bloemfontein as its centre) the drop had been 20 per cent” (Unknown, *The Rand Daily Mail*, 24 November 1933).

Understandably, any South African reading “Changed S.A. Rainfall” would be benumbed with an uncomfortable level of fear, especially as no underlying cause nor solution is proposed by Dr. Schumann. Furthermore, Dr. Schumann is argued to exacerbate the level of fear by stating the following:

> ““The report of the Drought Commission in 1923 showed that the Union’s rainfall had not decreased measurably. Most scientists who have expressed their views on the subject hold that opinion, although any farmer will tell you our climate has deteriorated. As far as my investigations have gone I must side with the farmer, and against the scientists. During

> the last forty years there has been a very decided change in our rainfall position”” (Unknown, *The Rand Daily Mail*, 24 November 1933).

While ordinary citizens that argued that ‘climate change’ was occurring could rejoice in the Chief Meteorologists’ admittance that indeed ‘climate change’ was occurring, it is also argued that citizens, and Dr. Schumann after his admittance, would also feel unsupported by the wider South African scientific community, again an implicit continuation of Moore’s letter rationale of dissatisfaction with the South African scientific community.

A second occurrence of differing information, in comparison to other previously published articles from other newspapers, was also identified. While interviewing Dr. Schumann, the author of “Changed S.A. Rainfall” questioned Dr. Schumann about the feasibility of the Kalahari Scheme as a solution to the ‘drought problem’, to which he replied:

> ““The first inference is that the lakes actually existed at one time,” continued Dr. Schumann. “Whether that is so I am not in a position to say. The indications are there, and it is true that there are photographs of David Livingstone [Scottish colonial missionary] standing on the shores of Ngami [a seasonally filled endorheic lake by the Taughe River in Botswana] which show it to be a large sheet of water. Only research into old writings can help us to decide. Investigation on the subject is badly needed. The second inference to be drawn for the Schwarz theory”, said Dr. Schumann, was that South Africa’s climate had deteriorated. “Here one is on slippery ground,” proceeded the speaker. … Returning to a consideration of the Schwarz theory, which aimed at the restoration of the Ngami lakes, Dr. Schumann mentioned that an expedition had actually investigated that possibility in 1925. It had reported that it would be possible to divert the Zambesi suitably at a cost of about £2.000.000. Thus far the Schwarz scheme was not Utopian, but the question was whether the creation of this great sheet of water would improve South Africa’s climate. “Superficially, I don’t think it would improve rainfall, except in the neighbourhood of the lakes themselves,” said Dr. Schumann. “Schwarz wanted to create one great lake as big as the Free State, but the probability is that the lake

> created would be no bigger than Basutoland, which would exercise very little influence on our climate. Contrary to popular belief, 93 per cent., of the rain that falls in South Africa is evaporated. The added evaporation from Professor Schwarz's lake would be only 3 per cent"" (Unknown, *The Rand Daily Mail*, 24 November 1933).

It must be noted that the author of the extracted article differed from a previously published article, in this case "Kalahari Scheme" published by *The Star*, in the methodological explanations of the Kalahari Scheme. To elaborate: (i) in "Kalahari Scheme" the author writes: "If Professor [Schwarz's] scheme were carried out three lakes would be re-filled, and that could be done by damming up the Kunene River [which flows from Angola south to Namibia]", while (ii) in "Changed S.A. Rainfall", the author states that the lake is actually that of the Ngami with the Zambesi being redirected to restore the lake (Unknown, *The Star*, 8 April 1925; Unknown, *The Rand Daily Mail*, 24 November 1933). Furthermore, Dr. Schumann's greater elaborated explanation of the findings on the feasibility of the Kalahari scheme further adds insight into the role governmental agencies played in attempting to assess and address the 'drought problem' (*The Rand Daily Mail*, 24 November 1933). Even though Dr. Schumann agrees with the feasibility findings of the Kalahari scheme investigation, their disagreement with his own findings places him in a precarious position: not only as the Chief meteorologist, a representative of government, but also in relation to their standing in the meteorological field whereby he admits to defecting from the consensus held by the South African scientific community on early climate change (*The Rand Daily Mail*, 24 November 1933).

Another article published by *The Rand Daily Mail* covering Dr. Schumann' latest findings is titled "Is South Africa Drying Up?", in which the author summarises Dr. Schumann and Mr. W.R. Thompson's, senior lecturer in Agronomy at the University of Pretoria, research findings on the 'drought problem':

> "There has been a gradual decrease in South Africa's rainfall during the last 40 to 50 years. This decrease has become accentuated since 1917 [numerical figures are absent from the article]. **NOT PERMANENT.** This conclusion is reached by [Dr]. T.E.W. Schumann, Chief Union Meteorologist; and Mr. W.R. Thompson, Senior Lecturer in Agronomy at

> the University of Pretoria, in a report on rainfall in the Union that should assist in solving the country's greatest agricultural problem—drought. It is made clear, however, that there is yet no proof of permanent diminution in rainfall and that periods of plentiful rain may still be expected" (Unknown, *The Rand Daily Mail*, 8 January 1935).

Dr. Schumann and Mr. Thompson throughout their 46-page report, covered in part by the author of "Is South Africa Drying Up?", vehemently stressed that a permanent diminution in rainfall was not occurring, "It is in no way intended to imply that the country is actually drying up" (Unknown, *The Rand Daily Mail*, 8 January 1935). However, interestingly Dr. Schumann and Mr. Thompson's own findings contradict their conclusion that a decrease in rainfall was not permanent:

> "After considering South African rainfall curves over a lengthy period, the writers affirm that the fact cannot be denied that a diminution in rainfall had been taking place over a large part of South Africa over the last 40 to 50 years [numerical figures are absent from the article]. … "Moreover, the rainfall curves reveal that since 1917 practically the whole of Natal, Transvaal and parts of the O.F.S. [Free State], in addition to the Cape Midlands, have been subject to a distinctly diminishing rainfall"" (Unknown, *The Rand Daily Mail*, 8 January 1935).

Perplexingly, Dr. Schumann and Mr. Thompson argue that the basis to their 'no permanent diminution of rainfall' conclusion lies in them comparing their findings with those of a similarly conducted Australian report: "The curves of Australian rainfall show crests and troughs in every way as pronounced as those in South Africa, and there is ample reason to believe that during some future epoch the present downward trend may be followed by an upward one" (Unknown, *The Rand Daily Mail*, 8 January 1935). Problematically, Dr. Schumann and Mr. Thompson's conclusion, and the basis for their conclusion, places their perceived understanding of 'climate change' under scrutiny: (i) were the similar trends found in the Australian report seen as a barometer of the new normalised levels of rainfall, even for South Africa, and (ii) why proclaim that in 'some future epoch an upward trend may occur' without substantive evidence? While their own findings contradict this, unfortunately

these questions among a myriad of others were not answered and/or covered in said article.

The way in which “Is South Africa Drying Up?” differs in subject matter from previously published articles by *The Rand Daily Mail* lies in the facet covered, both natural and anthropogenic (Table 5.3). The reason for the facet of both natural and anthropogenic early climate change to be covered is rooted in Dr. Schumann and Mr. Thompson’s recommendations (Unknown, *The Rand Daily Mail*, 8 January 1935). The first recommendation is that due to anthropogenic activities exacerbating the ‘drought problem’ they should be urgently addressed:

> “After condemning veld-burning, overstocking, unsympathetic grazing and similar practices, the investigators state:— “Granted that the decrease of rainfall in some areas has probably had a dominant influence on the vegetation, this fact in no way justifies mismanagement and ill-treatment of natural vegetation by overstocking, veld-burning and other detrimental practices. In fact, all the more reason may be adduced for protecting the natural flora against abuse by man. Every effort must be exerted under the present circumstances to obtain maximum benefit from the limited moisture supply available. Moisture limitation, with its train of evil consequences, cannot be over-emphasised in South Africa”” (Unknown, *The Rand Daily Mail*, 8 January 1935).

Unbeknownst to Dr. Schumann and Mr. Thompson, and/or under-examined by the author of the article, their recommendation on restricting anthropogenic practices, such as deforestation for agricultural purposes, and their argument for the protection of flora would later be argued by climatologists as playing a critical role in mitigating climate change (Unknown, *The Rand Daily Mail*, 8 January 1935; IPCC, 2013, 2014a, and 2014b). The second recommendation by Dr. Schumann and Mr. Thompson, in agreement with the same recommendation made by the Drought Commission, is that seasonal forecasts, and long-range forecasts be implemented so as to mitigate economic losses, especially for the agricultural sector (Unknown, *The Rand Daily Mail*, 8 January 1935). In addition to their second recommendation Dr. Schumann and Mr. Thompson argue that secular trends be researched so as to provide ample evidence in order to conduct accurate long-range forecasting:

> ""In spite of this strong recommendation [by the Drought Commission], no systematic attempt at long-range forecasting has as yet been made in the Union," state the writers. "In the past long-range forecasting has been confined in the main to prediction of weather conditions six months in advance. Although considerable success has been attained in such seasonal forecasts, the factors which influence the nature of a season are of such complexity that it is highly problematical whether seasonal forecasts will ever attain that degree of reliability to which we are accustomed in daily forecasts. It seems, however, that there may be greater prospects of success in forecasting secular trends than in ordinary seasonal forecasting. It has been indicated that secular variations have a real physical significance, and it is more than likely that the factors which cause these secular variations are much less complex than the factors which bring about annual fluctuations. If this be so then the problem resolves itself into a study of the factors on which secular variations depend"" (Unknown, *The Rand Daily Mail*, 8 January 1935).

The third and final recommendation and forewarning by Dr. Schumann and Mr. Thompson is that the South African government needed to bolster its role in research and policy change (Unknown, *The Rand Daily Mail*, 8 January 1935). In sum, Dr. Schumann and Mr. Thompson's reports are argued to be comprised of an assortment of perplexing and compelling arguments, findings, and recommendations, which did not go unnoticed by the public nor the authors of the following two articles that were published the next day—"The Drought Menace" & "Not So Dry" (Unknown, *The Rand Daily Mail*, 8 January 1935; Unknown, *The Rand Daily Mail*, 9 January 1935a).

The authors of "The Drought Menace" begin their article by providing a summary of Dr. Schumann and Mr. Thompson's report, problematically as was found in "Is South Africa Drying Up?" no numerical figurers were provided, before critiquing their arguments, findings, and recommendations:

> "[Writing on the Australian records used as the basis of Dr. Schumann and Mr. Thompson's argument that a permanent decrease in rainfall was not occurring]… "there is ample reason to believe that during some future

> epoch the present downward trend may be followed by an upward one." But, reassuring as this latter statement may be the facts given in the report are important enough to warrant very serious consideration. Experts of the Union Department of Agriculture have expressed the view that "out of every five years it may be expected that three will be dry"" (Unknown, *The Rand Daily Mail*, 9 January 1935a).

The authors continue by supporting the Drought Commission and Dr. Schumann and Mr. Thompson's recommendations that the feasibility of long-range forecasting be investigated, and that anthropogenic practices such as veld-burning and overstocking among others be addressed so as to mitigate the current impacts emanating from the 'drought problem' (Unknown, *The Rand Daily Mail*, 9 January 1935a). Thereafter, the author concludes by stating that "… while any addition to our knowledge of weather cycles and similar phenomena is to be welcomed, it will do little effective good unless more vigorous measures are taken to eliminate the known factors [anthropogenic practices] which are to-day spreading desert conditions over wide areas of South Africa" (Unknown, *The Rand Daily Mail*, 9 January 1935a). It is for these reasons "The Drought Menace", as was found with its previously published article "Is South Africa Drying Up?", is an article that covered the facet of both natural and anthropogenic climate change (Unknown, *The Rand Daily Mail*, 8 January 1935; Unknown, *The Rand Daily Mail*, 9 January 1935a).

The last article to be analysed for *The Rand Daily Mail* for the 1906-1955 period is the anomalous opinion article titled "Not So Dry", published alongside "The Drought Menace", and the day after "Is South Africa Drying Up?" (Unknown, *The Rand Daily Mail*, 9 January 1935b). In the article, the author chastises Dr. Schumann and Mr. Thompson's report findings, which is apparent from the title onwards as "Not So Dry[?]" is a parody on their conclusion of the report's findings that only a gradual decrease in rainfall was found to exist, and that this trend was not permanent (Unknown, *The Rand Daily Mail*, 8 January 1935; Unknown, *The Rand Daily Mail*, 9 January 1935b). "Not So Dry" is argued to encapsulate and further exemplify the dissatisfaction of South Africans in not receiving direct definitive answers on the underlying cause(s) from the South African scientific community on the 'drought problem':

> “Is South Africa drying up? Science is asking this question … . Apart from this, we took the matter up at once when we found they were interested in it. So we slipped out before breakfast to have a look at our rain-gauge. Sure enough it was dry as a bone. A skeleton bone, that is, not a bone with all the meat still around it. … Our data on this point, we thought, might interest the scientists in their drying up theory. Nothing is so dry, we thought, as a whole lot of figures and ours might come as a little welcome relief. In brief, our records taken from our own rain-gauge every morning with the dew still fresh on them showed:
>
> | | |
> |---|---|
> | January 5 | 0.0 ins. |
> | January 6 | 00.00 ins. |
> | January 7 | 0000.0000 ins. |
> | January 8 | 000000000.000000000 ins. |
>
> If this is not drying up we should like to know what is [?] … Science knows no limit” (Unknown, *The Rand Daily Mail*, 9 January 1935b).

Moreover, “Not So Dry” is argued to be an unequalled article for the first half of the 20th century, as its author vehemently provides infallible insight into the possible dissatisfied sentiment of ordinary South Africans towards the South African scientific community (Unknown, *The Rand Daily Mail*, 9 January 1935b). Even to the very end, the author of this article continues to express their dissatisfaction towards science by concluding with a sardonic comment; “Science knows no limit” (Unknown, *The Rand Daily Mail*, 9 January 1935b).

5.6 Linguistic repertoire and General Tone

When analysing the linguistic repertoire of articles, the following was found (Table 5.6.1): (i) 6 articles made use of strong adjectives that categorised them under uncertainty (such as, “insufficient”, and “wrong”), 11 were categorised under risk (9 explicit and 2 implicit), 8 under adaptation and mitigations initiatives frame and 14 articles could not be categorised. The large portion of ‘other’ categorised linguistic repertoire framed articles, 14 in total, is due to the authors of the articles not making use of strong adjectives or authors using multiple strong adjectives from multiple frames. The dominance of the risk frame, explicit usage of risk adjectives in particular, illustrates that authors could more easy emphasise subject matter under the risk frame. Furthermore, (ii) 8 articles made use of a metaphor, 5 were

categorised as uncertainty, 2 as risk (both implicit) and 1 as the adaptation and mitigation initiatives frame. The uncertainty framed metaphors dominated as they are arguably the easiest to make use of when authors emphasise uncertainty itself in the science of early climate change for example, the author of “Prophet Versus Expert” made use of an uncertainty frame metaphor was when writing about the scientific consensus on both climate research and weather forecasts; “Forewarned is forearmed” (Table 5.5.1) . Lastly, (iii) when conducting a simple word count 14 articles made use of the uncertainty keywords, 10 the risk keywords, 8 the adaptation and mitigation keywords and 7 were categorised as ‘other’ keywords. These ‘other’ terms were categorised due to articles not having matching keywords under the frames selected or the author made use of multiple combinations of keywords. The high usage of uncertainty keywords indicated that the uncertainty frame is the simplest to populate with multiple keywords.

Furthermore, the general tone/tenor of all articles was found to contain a dominate tone/tenor of uncertainty (16), evident in the authors’/author’s discussion on the subject matter of early climate change, including on the scientific consensus, as previously discussed (Table 5.3). Following uncertainty as the dominate general tone/ tenor: 13 articles had a general tone/tenor of adaptation and mitigation, 9 had risk (7 explicit and 2 implicit) and one article’s tone/tenor that was categorised as ‘other’, the previously discussed article ““Thirstland” Redemption” where Professor Schwarz’s theory is criticised (Unknown, *The Star*, 25 April 1925b). The key quotes extracted to add credibility to the aforementioned category selection of a dominate tone/tenor of uncertainty include: “They could not be dogmatic on the subject until a more thorough and detailed investigation had been made”, “How do we know that earlier statistics are as reliable as the modern?”, and “On the other hand, it would be very rash to assert categorically that a drying-up process is not taking place” (Table 5.6.2) (Unknown, *The Pretoria News*, 23 November 1933; Unknown, *The Pretoria News*, 30 November 1933; Unknown, *The Pretoria News*, 9 December 1933). In sum, both the linguistic repertoire and general tone/tenor identify the smaller minutiae as to how authors structured their early climate change articles, and also further validates that author preference, social actors sourced and the subsequent subject matter are the most fundamental aspect of the articles.

Table 5.6.1: Linguistic Repertoire

Article Title and Year	Are there uses of strong adjectives, such as 'enormous', 'large' or 'substantial', which stresses: a)Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the adjective used i) implicit or ii) explicit?	Is there a strong dominant metaphor in the article which captures: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the metaphor used i)implicit or ii) explicit?	Doing a simple word count, how many times do the following words, and their synonyms) appear in the article? a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide the frequency for selected option
Advance of the Desert (26 August 1922)	b) Risk ('enormous')	ii) Explicit	f) Other (none)	N/A	d) Adaptation and mitigation (twelve times)
The 1924 Rainfall (6 January 1925)	f) Other (no strong adjectives)	N/A	f) Other (none)	N/A	b) Risk (one time)
Kalahari Scheme (8 Apr 1925)	d) Adaptation and mitigation ('severe')	N/A	d) Adaptation and mitigation ("If they failed to carry out the scheme it would not redound to their honour")	N/A	d) Adaptation and mitigation (7 times)
The Kalahari Scheme (24 Apr 1925a)	d) Adaptation and mitigation ('dryer')	N/A	f) Other (No)	N/A	d) Adaptation and mitigation (4 times)
"Thirstland" redemption (25 Apr 1925b)	f) Other (Certainty, as article criticised Schwarz's theory—'incapable')	N/A	f) Other (No)	N/A	f) Other (Certainty, as article criticised Schwarz's theory)
Correspondence (After 25 April 1925)	b) Risk ("disastrous desiccation")	ii) Explicit	f) Other (none)	N/A	b) Risk (three times)
Wet and dry (5 May 1925)	f) Other (none more on stated facts)	N/A	f) Other (No)	N/A	f) Other (implicit risk, but no matching key words or synonyms)
Secrets of the weather (9 May 1925)	a) Uncertainty ('extraordinary')	N/A	a) Uncertainty ("At present the Meteorological staff at Pretoria has too big a load to carry")	N/A	a) Uncertainty (9 times)
A time of storms (1 Dec 1925)	a) Uncertainty ('abnormal')	N/A	f) Other (No)	N/A	a) Uncertainty (4 times)

Article Title and Year	Are there uses of strong adjectives, such as 'enormous', 'large' or 'substantial', which stresses: a)Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the adjective used i) implicit or ii) explicit?	Is there a strong dominant metaphor in the article which captures: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the metaphor used i)implicit or ii) explicit?	Doing a simple word count, how many times do the following words, and their synonyms) appear in the article? a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide the frequency for selected option
The Weather (7 Jan 1926)	f) Other (none that are strongly emphasised)	N/A	f) Other (No)	N/A	a) Uncertainty (6 times)
Waiting for the rain (12 Jan 26)	f) Other (none that are strongly emphasised)	N/A	f) Other (No)	N/A	a) Uncertainty (3 times)
Sun and weather (16 Jan 26)	f) Other (none more on stated facts)	N/A	f) Other (No)	N/A	a) Uncertainty (4 times)
The hurricane month (25 Apr 1926)	b) Risk ('vigorous')	ii) Explicit	f) Other (No)	N/A	b) Risk (3 times)
Frost does damage in the city (23 Jul 1926)	f) Other (none more on current weather)	N/A	f) Other (No)	N/A	f) Other (a combination of explicit risk and uncertainty, but no matching key words or synonyms)
A cyclone year (10 Nov 1926)	b) Risk ('maximum')	ii) Explicit	f) Other (No)	i) Implicit	b) Risk (2 times)
Readers' Po… (16 Oct 1933)	b) Risk ('unprecedented')	i) Implicit	f) Other (none)	N/A	a) Uncertainty (4 times)
The Remedy for Drought (17 Oct 1933)	b) Risk ('serious')	ii) Explicit	b) Risk "Will his voice be the voice of one crying in the wilderness?"—referring to Schwarz's predictions	i) Implicit	b) Risk (6 times)
Is the Union Drying Up? (23 Nov 1933)	b) Risk ('undoubted')	i) Implicit	f) Other (none)	N/A	f) Other (none really that stand out as dominant)
Changed S.A. Rainfall (24 Nov 1933)	b) Risk ('serious')	ii) Explicit	f) Other (none)	N/A	b) Risk (5 times)

Article Title and Year	Are there uses of strong adjectives, such as 'enormous', 'large' or 'substantial', which stresses: a)Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the adjective used i) implicit or ii) explicit?	Is there a strong dominant metaphor in the article which captures: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the metaphor used i)implicit or ii) explicit?	Doing a simple word count, how many times do the following words, and their synonyms) appear in the article? a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide the frequency for selected option
Drying Up? (25 November 1933)	f) Other (no strong adjectives)	N/A	a) Uncertainty ("There are no pies today like those which mother used to bake")	N/A	a) Uncertainty (4 times)
Prophet versus expert (30 Nov 1933)	a) Uncertainty ('insufficient')	N/A	a) Uncertainty ("Forewarned is forearmed")	N/A	a) Uncertainty (7 times)
"Prophet versus Expert" (9 December 1933)	a) Uncertainty ('wrong')	N/A	f) Other (none)	N/A	a) Uncertainty (3 times)
Strange weather (11 June 1934)	d) Adaptation and mitigation ('chronic')	N/A	f) Other (No)	N/A	d) Adaptation and mitigation (2 times)
Huge afforestation plan in America (23 Jul 1934)	b) Risk ('unexampled')	ii) Explicit	f) Other (No)	N/A	b) Risk (6 times)
Effects of trees on climate (24 Jul 1934)	d) Adaptation and mitigation ('opportune')	N/A	f) Other (No)	N/A	d) Adaptation and mitigation (6 times)
Development of the Kalahari [Pt. 1] (19 August 1934)	f) Other (a combination of Risk, 'deleterious' and uncertainty, 'speculative')	ii) Explicit	f) Other (none)	N/A	f) Other (a combination of risk and uncertainty 6 times; 3 each)

Article Title and Year	Are there uses of strong adjectives, such as 'enormous', 'large' or 'substantial', which stresses: a)Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the adjective used i) implicit or ii) explicit?	Is there a strong dominant metaphor in the article which captures: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the metaphor used i)implicit or ii) explicit?	Doing a simple word count, how many times do the following words, and their synonyms) appear in the article? a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide the frequency for selected option
Development of the Kalahari [Pt. 2] (26 August 1934)	f) Other (a combination of Adaptation and mitigation, 'feasible' and uncertainty, 'problematical')	N/A	f) Other (none)	N/A	f) Other (a combination of Adaptation and mitigation and uncertainty, 8 times; 4 each)
The Kalahari and Our Climate [Pt. 1] (2 September 1934)	d) Adaptation and mitigation ('obtainable')	N/A	f) Other (none)	N/A	d) Adaptation and mitigation (6 times)
The Kalahari and Our Climate [Pt. 2] (9 September 1934)	d) Adaptation and mitigation ('unprecedented')	N/A	f) Other (none)	N/A	d) Adaptation and mitigation (4 times)
Is South Africa Drying Up? (8 Jan 1935)	b) Risk ('severity')	ii) Explicit	f) Other (none)	N/A	b) Risk (2 times)
The Drought Menace (9 Jan 1935a)	d) Adaptation and mitigation ('vital')	n/a	f) Other (none)	N/A	a) Uncertainty (3 times)
Not So Dry (9 Jan 1935b)	f) Other (no strong adjectives were used)	n/a	a) Uncertainty (Author(s) proceed to brush off scientists as incompetent: in them not being able to identify, and address what it is, that is causing South Africa's rainfall to decrease —'[Speaking of their rain gauges] Sure enough, it was as dry as a bone')	N/A	f) Other (The author made no direct usage of key words or phrases).

Article Title and Year	Are there uses of strong adjectives, such as 'enormous', 'large' or 'substantial', which stresses: a)Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the adjective used i) implicit or ii) explicit?	Is there a strong dominant metaphor in the article which captures: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide an example for selected option	If 'risk' is the answer to the previous question, is the metaphor used i)implicit or ii) explicit?	Doing a simple word count, how many times do the following words, and their synonyms) appear in the article? a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify) And provide the frequency for selected option
The Drought Problem in South Africa [Pt. 1] (11 August 1935)	d) Adaptation and mitigation ('practicable')	N/A	f) Other (none)	N/A	d) Adaptation and mitigation (5 times)
The Drought Problem in South Africa [Pt. 2] (18 August 1935)	a) Uncertainty ('questionable')	N/A	f) Other (none)	N/A	a) Uncertainty (5 times)
The Kalahari Scheme Again (18 August 1935)	f) Other (no strong adjectives)	N/A	f) Other (none)	N/A	a) Uncertainty (3 times)
Scientists and weather "prophets" disagree (14 Jan 1939)	a) Uncertainty ('uncertain')	N/A	f) Other (No)	N/A	a) Uncertainty (6 times)
Rains not what they were (6 Apr 1948)	f) Other (none more on current rainfall research)	N/A	a) Uncertainty ("Perhaps the excellent rainy season that just ended has started an upward trend again; perhaps it is merely a flash in the pan")	N/A	a) Uncertainty (3 times)
63-Year-Old Rainfall Records for New Bethesda Analysed (10 January 1949)	f) Other (no strong adjectives)	N/A	b) Risk ("The writing is on the wall!")	i) Implicit	b) Risk (five times)
Eight Months Very Dry (10 January 1949)	b) Risk ("lowest for 50 years")	ii) Explicit	f) Other (none)	N/A	b) Risk (two times)

Table 5.6.2: General tone/tenor

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
Advance of the Desert (26 August 1922)	d) Adaptation and mitigation	N/A	Yes	"Meanwhile, the more the people who understand the nature of the project, the sooner will the scheme come into being"—Prof. Schwarz
The 1924 Rainfall (6 January 1925)	b) Risk	ii) Explicit	Yes	"It will be seem that [for 1924], with the exception of January and December, every month of the year had a rainfall much under the average [in comparison to a 40 year monthly rainfall average]"—Author
Kalahari Scheme (8 Apr 1925)	d) Adaptation and mitigation	N/A	Yes	"They ought at least to investigate the feasibility of the scheme" (Mr. Steytler)
The Kalahari Scheme (24 Apr 1925a)	d) Adaptation and mitigation	N/A	Yes	"Not only that, but this scheme would restore this moisture over 75,000 square miles of that territory and change it from a desert into a fertile country, a fact which was bound to affect very considerably the climate of South Africa" (Author)
"Thirstland" redemption (25 Apr 1925b)	f) Other (article criticised Schwarz's theory)	N/A	Yes	"He did not contest the points, but he told me I talked like a schoolboy, and left it at that" (Author)
Correspondence (After 25 April 1925)	d) Adaptation and mitigation (Risk is heavily present as well, however due to the author mainly addressing risk through an explanation of their Kalahari Scheme it was decided that Adaptation and mitigation initiatives is the general tone/tenor frame used)	N/A	Yes	Prof. Schwarz speaking of his Kalahari Scheme — "At present the excessively dry area in the centre absorbs all moistures from the sea; then, if humid air spreads over the coastal mountains, the lands on the seaward side will also benefit by having their rains in their proper seasons"
Wet and dry (5 May 1925)	b) Risk	i) Implicit	Yes	"It has not been so dry in this locality for 30 years" (Author, Riversdale correspondent)

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
Secrets of the weather (9 May 1925)	a) Uncertainty	N/A	Yes	"'Here I have been voyaging for year after year,' said one old sea captain, 'and yet I have never known anything exactly like this in my 35 years' experience. Seasons used to be definite, but since wireless has been used to such an extent they seem to have altered and to have none of the old regularity'" (Author)
A time of storms (1 Dec 1925)	a) Uncertainty	N/A	Yes	"The question whether any connection exists between what occurs here an in other parts of the world still awaits discussion to advance at the moment" (Author)
The Weather (7 Jan 1926)	a) Uncertainty	N/A	Yes	"As we have pointed out before, it would be idle for anyone either to affirm or deny that there is any connection between such things in different parts of the world, because, even after some remarkable advances during the past decade or two, science is still groping as regards the underlying conditions which make for weather changes upon the earth at large" (Author)
Waiting for the rain (12 Jan 26)	a) Uncertainty	N/A	Yes	"Sunspots have immediate effects on magnetic conditions in the earth, but their influence on weather, particularly on rainfall, has never been shown to be immediate or direct; what does seem indicated is a general condition of affairs over a period of years associated with a condition of the sun, of which the sunspots are merely symptoms" (Author)
Sun and weather (16 Jan 26)	a) Uncertainty	N/A	Yes	"Work on the variability of the sun's radiation has occupied me for 20 years, and I am almost ashamed to confess that after all that experience one knows so little of the problem" (Dr. Abbott)
The hurricane month (25 Apr 1926)	a) Uncertainty	N/A	Yes	"The sunspot period we are now passing through seems consequently to be a pretty vigorous one, and it might have been expected that tornadoes—if there is really any connection—would occur this April" (Author)
Frost does damage in the city (23 Jul 1926)	a) Uncertainty	N/A	Yes	"Johannesburg is always breaking weather records. You never can tell what it is going to do next" (Union Observatory official)

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
A cyclone year (10 Nov 1926)	b) Risk	ii) Explicit	Yes	"And why this activity in the atmosphere? The only plausible explanation that can be advanced is that it is associated in some way with the increased output of energy from the sun, which is advancing towards a maximum of the sunspot cycle of 11 years and a fraction" (Author)
Readers' Po… (16 Oct 1933)	d) Adaptation and mitigation (in the mist of uncertainty the author tries to end up backing the Kalahari Scheme —seeking a plan of action)	N/A	Yes	"Both are therefore men of great practical experience and have the necessary qualifications to solve our problems" — author
The Remedy for Drought (17 Oct 1933)	b) Risk (in the mist of risk the author tries to end up backing the Kalahari Scheme —seeking a plan of action and asks government to intervene, adaptation)	ii) Explicit	Yes	"The most serious matters affecting the prosperity of South Africa generally and the mining industry and Johannesburg in particular are the recurring droughts"—author
Is the Union Drying Up? (23 Nov 1933)	a) Uncertainty	N/A	Yes	"They could not be dogmatic on the subject until a more thorough and detailed investigation had been made" — Author(s)
Changed S.A. Rainfall (24 Nov 1933)	b) Risk	ii) Explicit	Yes	"The theory that South Africa's rainfall is decreasing, particularly over the inland areas, was advanced by Dr. Theo Schumann… also showed him that where the incidence of rainfall was decreasing its intensity was increasing" — Author
Drying Up? (25 November 1933)	a) Uncertainty	N/A	Yes	"It can be accepted that this land of ours is subject to periodical droughts and we must make up our minds to the fact"—Author(s)
Prophet versus expert (30 Nov 1933)	a) Uncertainty	N/A	Yes	"How do we know that earlier statistics are as reliable as the modern?"—Author(s)

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
"Prophet versus Expert" (9 December 1933)	a) Uncertainty (Dr. Schumann seems shocked that they were taken out of context, and even subliminally seems as though they are backtracking on their previous support for the theory that South Africa was drying up)	N/A	Yes	"On the other hand, it would be very rash to assert categorically that a drying-up process is not taking place" — Dr. Schumann as the author
Strange weather (11 June 1934)	b) Risk	ii) Explicit	Yes	"What should have been the rainy season of 1932-33 saw about half the normal fall in most parts of the Transvaal, the Free State and the neighboring parts of South Africa, carrying on a record of almost unexampled drought" (Author)
Huge afforestation plan in America (23 Jul 1934)	d) Adaptation and mitigation	N/A	Yes	"Designed to combat the growing tendency to chronic drought which threatens the existence of the agricultural communities in the Middle West, the project involves the planting of an immense forest belt running north and south from the Canadian boarder to the Texas 'panhandle'"— Author (Washington, *The Times*)
Effects of trees on climate (24 Jul 1934)	d) Adaptation and mitigation	N/A	Yes	"If the reports in the papers are correct. America is embarking upon one of the greatest experiments ever attempted by man. In a series of articles about a year ago I advocated a similar ambitious afforestation scheme for this country in order to improve the climate and the water supply" (Dr. Schumann)
Development of the Kalahari [Pt. 1] (19 August 1934)	d) Adaptation and mitigation	N/A	Yes	"I should state at the outset that I am very much inclined to favour the carrying out of the Kalahari scheme, with qualifications that will appear in the course of the succeeding paragraphs" (Dawson—author)
Development of the Kalahari [Pt. 2] (26 August 1934)	d) Adaptation and mitigation	N/A	Yes	"The improvement of the Kalahari for its own sake would, on the other hand, be the concern of those who undertook it, and there could be no objectors" (Dawson—author)
The Kalahari and Our Climate [Pt. 1] (2 September 1934)	d) Adaptation and mitigation	N/A	Yes	"Conservation of moisture by better farming, dams, erosion-prevention works, veld improvement, etc. is decidedly worth while for its own sake" (Dawson—author)

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
The Kalahari and Our Climate [Pt. 2] (9 September 1934)	d) Adaptation and mitigation	N/A	Yes	"The Government has now provided an unprecedented opportunity for the realisation of such schemes, and those which may have appeared unlikely to return the farmer his capital are no within the range of accomplishment" (Dawson—author).
Is South Africa Drying Up? (8 Jan 1935)	b) Risk	ii) Explicit	Yes	"In applying the subject of rainfall to the problem of agriculture, the writers first quote figures from the annual Union Year Books to show the enormous stock losses suffered through droughts"—Author
The Drought Menace (9 Jan 1935a)	d) Adaptation and mitigation ('… Commission agree that there are vital human factors which make for a less efficient utilization of such rain… '—seeking a plan of action)	N/A	Yes	"… while any addition to our knowledge of weather cycles and similar phenomena is to be welcomed, it will do little effective good unless more vigorous measures are taken to eliminate the known factors [human factors such as veld-burning, over-stocking, unskillful grazing and other practices] which are to-day spreading desert conditions over wide areas of South Africa." — Author
Not So Dry (9 Jan 1935b)	a) Uncertainy	N/A	Yes	"If this is not drying up we should like to know what is." —Author
The Drought Problem in South Africa [Pt. 1] (11 August 1935)	d) Adaptation and mitigation	N/A	Yes	"Otherwise the surveyor's levels agree with those of Professor Schwarz and prove the scheme to be practicable from an engineering point of view" (Moore—author)
The Drought Problem in South Africa [Pt. 2] (18 August 1935)	a) Uncertainty	N/A	Yes	"A thorough investigation carried out by experts will cost at most £50.000, which is a very small sum compared with the expense of any remedial measures" (Moore—author).
Sun and weather (16 Jan 1935)	a) Uncertainty	N/A	Yes	"[Writing about anthropogenic factors such as overstocking and veld-burning] The theory is that all this did not happen—or, if it did happen, it was on a much smaller scale—before the great Kalahari lakes dried up, because there was then available for evaporation a surface of inland water, estimated at 17,000 square miles, large enough to supply sufficient moisture to keep the climate equatable" (Author)
Scientists and weather "prophets" disagree (14 Jan 1939)	a) Uncertainty	N/A	Yes	"Climate has changed considerably from time to time in the past, though we cannot say with any degree of certainty how rapidly the change has occurred" (Prof. D. Brunt).

Article Title and Year	In the article, is there a dominant tone or tenor to the article: a) Uncertainty b) Risk c) Opportunity d) Adaptation and mitigation e) Developing versus developed f) Other (specify)	If 'risk' is the answer to the previous question, is the general tone/tenor i) Implicit or ii) Explicit?	If there is a key quote in the text which can be pulled out to give credibility to the choice of coding for the initial question?	If yes for the previous question, what is it?
Rains not what they were (6 Apr 1948)	a) Uncertainty	N/A	Yes	"Since all water supply depends on rain, these disturbing rainfall trends deserve early and full investigation"
63-Year-Old Rainfall Records for New Bethesda Analysed (10 January 1949)	b) Risk	i) Implicit	Yes	"We were all criminally selfish. We lived for the day, and for ourselves only, not thinking of our children and posterity and of generations to come"—Erlank
Eight Months Very Dry (10 January 1949)	b) Risk	ii) Explicit	Yes	"The fall for the last eight months is the lowest for 50 years"—D. Hess, Bloemhof

5.7 Accompanying Graphic

Of the select number of articles that contained accompanying graphics, all graphics were either figures or tables used to illustrate specific points on early climate change based on datasets, the use of which is argued to have provided the reader with greater insight into the methodologies used and on the scientific findings presented. Examples include the previously extracted and discussed Figures 5.2.1.1 and 5.3.1.1. This is a departure from contemporary climate change visual analysis results which indicate that pictures of natural disasters are increasingly becoming more popularised when authors cover climate change. The exception to the trend identified in the SAWS archive was the portrait of Prof. Schwarz (Fig. 5.5.7.1 SP), therefore no further visual analysis took place.

Chapter 6: Conclusion

It must be noted that the SAWS archive contains articles that were written during the pre-apartheid and apartheid regimes, therefore the articles are only a partial representation of South African society as only English language newspapers were analysed. Essentially the archive is a white news orientated archive, hence, marginalised group perspectives, and voices were largely omitted or manipulated by the South African media. Nevertheless, the use of the SAWS archive and the underpinning robust methodological framework has taken this research into uncharted and exciting new areas where the results of this research has added a newfound understanding on how the the South African media reported on early climate change: as to what and how early climate change developed, subject and structure, and how the subject and structure changed chronologically. Furthermore, the undertaking of this research has aided in determining the drivers and influential relationships of media reporting under the influence of political, economic, and socio-cultural spheres of larger society — social actors. Lastly, by using the SAWS archive, and in adhering to the outlined aims and research questions, critical insights into the developments of the South African media's portrayal of climate change has been garnered, and diachronic relationships have been tested adequately, that would simply not otherwise exist without the undertaking of this study. The use of features as the dominant article type, highlights that journalists played an unequivocal role in taking their time and engaging with scientists and experts, among others, to disseminate meaningful articles on early climate change. Furthermore, social actors especially scientists and experts are ultimately argued as being the drivers of early climate change articles, specifically Prof. Schwarz sparking and driving the 'drying up' debate, early climate change coverage for 1906-1955 would have been left poorer. The debate pushed journalists and scientists to reassess the then current scientific consensus held, which at that time was still preoccupied with understanding local and global weather interlinkages (local-global weather nexus unlike the American weather and food dominant theme). The debate divided ordinary citizens who agreed with Prof. Schwarz while the South African scientific community opposed his theory. Some ordinary citizens and journalists felt that the South African scientific community did not provide adequate answers as to why they disagreed with Schwarz's theory. Journalists are also argued to have played a central and critical role in the development of early climate change and in the development of a scientific consensus thereon as they pushed for clarity on the underlying causes that resulted

in ‘climatic changes’, which subsequently expanded the debate to include both anthropogenic and natural facets of early climate change such as solar variability, ENSO and land-use change among others.

This research and the findings made herein can assist in the development of further research based on the portrayal of early climate change in a South African context. In essence this research is a explorative piece and has provided insight to the reporting of early climate change, in particular its keywords and themes which can be used by researchers when conducting similar research especially for digital archives such as the discussed Readex’s *Rand Daily Mail* archive. Moreover, in terms of physical archival research further research should be conducted on the SAWS archive, among others, so as to provide a deeper understanding of how early climate change was portrayed by Afrikaans (1906-1955) newspapers and other indigenous South African language newspapers to create a holistic view of what and how early climate change was reported on.

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Appendix 1: Coding Sheet for Newspaper Articles

The following coding sheet is partially adapted from Painter (2013, 143-149), additions and adaptations were made to meet with the secondary dataset used.

1. Newspaper:

   ……

   …….

2. Title of article:

   ……

   …….

3. Publication date

   ……

   …….

4. Author(s):

   ……

   …….

5. Article appearance:

5. Article type	Tick
a) News report	
b) Editorial	
c) Feature	
d) Opinion or Column piece	
e) Letter	
f) Other (specify)	

6. What facet of early climate change is discussed within the article?

6. Facet of early climate change discussed	Tick
a) Anthropogenic	
b) Natural	
c) Both anthropogentic and natural	
d) No clear distinction between the two	
e) Other (specify)	

7. What overarching terminology is being used to describe early climate change within the article? For example; climate change/global warming/greenhouse effect or other (specify):

   ……
   …….

8. What underlying process(es) of early climate change is predominantly being discussed within the article? For example; sea level rise/greenhouse effect/ warmer temperatures/change in rainfall patterns or other (specify):

   ……
   …….

9. Source(s) referenced:

9. Source(s) referenced	Tick	Name(s) and description(s) and indicate whether each source is International or local
a) Scientist(s)		
b) Expert(s)		
c) Scientific Report(s)		
d) Institution(s)		
e) Ordinary citizen(s)		
f) Unsourced as a whole		
g) Other		

10. Indicators of **uncertainty/certainty** frame:

    10.1 **General**: Did the article contain mentions of uncertainties about climate science/early climate change, including future projections? **(Y=1/N=0)**

    10.1.1 Did the article contain such terms as ‘increasing uncertainty’, ‘increasing evidence that’, ‘almost certain’, ‘most certain to date’, ‘record breaking’ (without an explanation) when referring to climate science/early climate change, including future projections? **(Y=1/N=0)**

    10.2 **Specific**: Did the article include uncertainty parameters or ranges in projections? **(Y=1/N=0)**

    10.2.1 Did the article mention the shortcomings of statistically based projections? **(Y=1/N=0)**

    10.2.2 Did the article mention the ‘extension of problem domain’ (more research

is needed)? **(Y=1/N=0)**

10.3 **Tone**: Did the article have a presence of 'duelling experts' suggesting contestation about some aspect of the science? **(Y=1/N=0)**

11. Indicators of **risk** frame:

11.1 Did the article include general, unsourced statements mentioning risks (broadly defined as possible adverse impacts or consequences) from, for example, warmer temperatures? **(Y=1/N=0)**

11.2 Did the article include named sourced statements from scientists/experts or scientific reports mentioning risk (broadly defined as possible adverse impacts or consequences) from, for example, warmer temperatures? **(Y=1/N=0)**

11.3 Did the article include statements, either sourced or unsourced, mentioning risks more explicitly, either by the use of the word 'risk', 'precaution' or 'insurance', or where the odds, probabilities or chance of something adverse happening are given? **(Y=1/N=0)**

11.4 Does the article include more information on scientific impacts or consequences from, for example, warmer temperatures compared to societal impacts or consequences?

11.4 Scientific impacts or consequences	**Tick**
a) Scientific	
b) Societal	
c) Both scientific and societal	
d) No clear distinction between the two	
e) Other (specify)	

12. Indicators of **opportunity** frame:

12.1 Did the article include statements, either sourced or unsourced, referring to the continuation of burning fossil fuels as a benefit? **(Y=1/N=0)**

12.2.1 If yes from 12.1, did the article mention the benefits as **(A = Economic, B = Societal, C = Both Economic and Societal, D = No clear distinction OR E = Other [Specify])**?

12.2.2 Did the article include named sourced statements from scientists/experts or scientific reports mentioning opportunities and/or possible positive benefits for

the continuation of the burning of fossil fuels? **(Y=1/N=0)**

12.3 Did the article include statements, either sourced or unsourced, mentioning opportunities and/or possible positive impacts from climate change, for example, warmer temperatures? **(Y=1/N=0)**

12.4 Did the article include named sourced statements from scientists/experts or scientific reports mentioning opportunities and/or possible positive impacts from climate change, for example, warmer temperatures? **(Y=1/N=0)**

13. Indicators of **adaptation and mitigation initiative** frame (opportunity but for the discontinuation of burning fossil fuels, essentially addressing climate change):

    13.1 Did the article include statements, either sourced or unsourced, referring to adaptation and mitigation initiatives as a benefit? **(Y=1/N=0)**

    13.1.1 If yes from 13.1, did the article mention the benefits as (A = Economic, B = Societal, C = Both Economic and Societal, D = No clear distinction OR E = Other [Specify])?

    13.1.2 If yes from 13.1, did the article include named sourced statements from scientists/experts or scientific reports mentioning opportunities and/or possible positive impacts for the discontinuation of burning fossil fuels, essentially addressing climate change? **(Y=1/N=0)**

14. Indicators of **developing versus developed** frame (developing world vs developed world):

    14.1 Did the article include statements, either sourced or unsourced, referring to early climate change as something only developed nations should address? **(Y=1/N=0)**

    14.2 Did the article include statements, either sourced or unsourced, referring to early climate change as only a developing nation's problem? **(Y=1/N=0)**

    14.3 Did the article include statements, either sourced or unsourced, referring to early climate change as a global problem? **(Y=1/N=0)**

15. **Dominant** framing of article

    15.1 **Salience of placing**: headline: is the headline predominantly one that contains:

15.1 Salience of placing: headline	Tick
a) Uncertainty	
b) Risk	
c) Opportunity	

15.1 Salience of placing: headline	Tick
d) Adaptation and mitigation	
e) Developing versus developed	
f) Other (specify)	

15.1.1 If the headline predominantly contains 'risk', is it **i) implicit or ii) explicit**?

15.2 First paragraph (6 lines): is the first paragraph predominantly one that contains:

15.2 First paragraph	Tick
a) Uncertainty	
b) Risk	
c) Opportunity	
d) Adaptation and mitigation	
e) Developing versus developed	
f) Other (specify)	

15.2.1 If the first paragraph predominantly contains 'risk', is it **i) implicit or ii) explicit**?

15.3 Concluding paragraph (last 6 lines): is the article's conclusion one that predominantly contains:

15.3 Concluding paragraph	Tick
a) Uncertainty	
b) Risk	
c) Opportunity	
d) Adaptation and mitigation	
e) Developing versus developed	
f) Other (specify)	

15.3.1 If the concluding paragraph predominantly contains 'risk', is it **i) implicit or ii) explicit**?

16. **Direct quotes**: are there direct quotes of named scientist(s)/expert(s) or scientific report(s) which predominantly contain:

16. Direct quotes	Tick	Number of different quotes
a) Uncertainty		
b) Risk		
c) Opportunity		
d) Adaptation and mitigation		
e) Developing versus developed		
f) Other (specify)		

16.1 If yes for b, ‘risk’, are the quotes **i) implicit or ii) explicit**?

16.2 Are the direct quotes from scientist(s) or expert(s) where they talk of their emotional response? **(Y=1/N=0)**

16.2.1 If yes for 16.2, overall what is the quoted scientist(s) or expert(s) dominant emotion?

16.2.1 Direct quotes: dominant emotion	Tick
a) Fear	
b) Worry	
c) Sadness	
d) Shock	
e) Surprise	
f) Other (specify)	

17. **Linguistic repertoire**:

17.1 **Use of adjectives**: are there uses of strong adjectives, such as ‘enormous’, ‘large’ or ‘substantial’, which stresses:

17.1 Linguistic repertoire: adjective	Tick	Provide one example
a) Uncertainty		
b) Risk		
c) Opportunity		
d) Adaptation and mitigation		
e) Developing versus developed		

17.1 Linguistic repertoire: adjective	Tick	Provide one example
f) Other (specify)		

17.1.1 If yes for b, ‘risk’, is the adjective used **i) implicit or ii) explicit**?

17.2 Is there a strong dominant **metaphor** in the article which captures:

17.2 Linguistic repertoire: metaphor	Tick	Provide one example
a) Uncertainty		
b) Risk		
c) Opportunity		
d) Adaptation and mitigation		
e) Developing versus developed		
f) Other (specify)		

17.2.1 If yes for b, ‘risk’, is the metaphor used **i) implicit or ii) explicit**?

17.3 **Relative frequency** of key words or phrases: doing a simple word count, how many times do the following words appear in the article?

17.3 Linguistic repertoire: relative frequency	Tick	Number of times word appears
a) Uncertainty		
b) Risk		
c) Opportunity		
d) Adaptation and mitigation		
e) Developing versus developed		
f) Other (specify)		

18. **General tone/tenor**:

18.1 In the article, is there a dominant tone or tenor to the article:

18.1 General tone/tenor	Tick
a) Uncertainty	
b) Risk	
c) Opportunity	

18.1 General tone/tenor	Tick
d) Adaptation and mitigation	
e) Developing versus developed	
f) Other (specify)	

18.1.1 If yes for b, 'risk', is the general tone/tenor **i) implicit or ii) explicit**?

18.2 If there is a key quote in the text which can be pulled out to give credibility to the choice of coding above? **(Y=1/N=0)**

18.2.1 If yes for 18.2, what is it?

……

19. **Mainstream consensus versus sceptical voices**:

19.1 Are skeptical voices included in the article which question some elements of mainstream climate science? **(Y=1/N=0)**

19.1.1 If yes for 19.1, how do they appear?

19.1.1 Mainstream consensus versus sceptical voices	Tick
a) Skeptic as author(s) of article	
b) Named skeptics	
c) Generic mentions ('skeptics say that…')	
d) Other (specify)	

19.1.2 If yes for 19.1, are they in the headline and/or first paragraph? **(Y=1/N=0)**

19.1.3 If yes for 19.1, are they in direct quotes? **(Y=1/N=0)**

19.1.4 If yes for 19.1, roughly what percentage of the article do their views represent?

19.1.4 Skeptical voices: percentage of article	Tick
a) 0-10%	
b) 10-50%	
c) 50-90%	
e) 90-100%	

19.1.5 If yes for 19.1, would you say that the article gives context about where the dominant scientific consensus lies? **(Y=1/N=0)**

20. **Accompanying graphic:**

20.1 Is the article accompanied by a graphic? **(Y=1/N=0)**

20.1.1 If yes for 20.1, what type of graphic, and what theme is displayed?

20.1.1 Accompanying graphic	Tick	Theme	Tick
a) Photograph		z) Natural Disaster/geohazard (including natural weather phenomenon such as tornadoes and hurricanes)	
b) Diagram (graphs, tables, charts)		y) Flood/drought (water systems/food systems)	
c) Illustration (cartoons, sketches, drawings)		x) Future projections	
e) Other (specify)		w) Other (specify)	