A model for language of science interpretation: Rhetorical understanding of climate change scientific discourse

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Abstract
The study explored the dynamics of the rhetoric of the models on climate change publications. The model for the language of science interpretation presented in this research paper was developed from the analysis of climate change publications. Additionally, the arguments presented in this study were drawn from a theoretical framework that saw rhetorical argument and discourse as a significant feature of science publications. The language filter model of science interpretation presented was intended to demystify the language of science. It clearly shows how knowledge as perceived by scientists goes through different stages before it reaches the consumers of that knowledge. Afterwards, the perceived knowledge goes through language interpretation and language is arguably affected by time. Regardless of how careful scientists can be in describing the observable elements of phenomena, cultural meanings and cultural bias are likely to subvert the aim of objectivity. The study adopted a qualitative approach. By employing a qualitative approach, the emphasis was to discover and understand the epistemological dynamics of the rhetoric of science interpretations. Rhetorical interpretations of science publications seem to be multifaceted, thus, requiring a research design that enabled such complexity to be analysed and explored. The study concluded that models seemed to be effective in dealing with large information; they, however, lack the epistemological and ontological interconnections between science and public interest.

Keywords: *model, science interpretation, rhetorical, discourse*

Introduction
The rhetoric of science seems to be grounded in the assumptions that rhetoric mediates the shape and the systematic influence of science. Gross (1990) argues that understanding science requires a legitimate subject of rhetoric. This is because rhetorical conjecture provides an illuminating model and a set of methodical techniques for the elucidation of the complex texts generated by particular cases of scientific communication or publications. Thus, the investigation was based on the theoretical framework that sees rhetorical argument in the form of a model as an important feature of scientific publications on climate change.

Gross (1993) contends that underneath the facade of objectivity resides a ferocious struggle to gain followers for a particular viewpoint and claim precedence for a breakthrough. Science findings and science knowledge are believed to have been founded as a result of rigorous testing and experimenting, and as such, they are equated to a strong rational conviction and do not depend on persuasion (Behrendt, 2001). Because of the traditional belief that science does not use persuasive techniques, there seems to be a dearth of critical information on the rhetoric of science models on climate change in Namibia. The role of rhetorical presence in scientific models and scientific knowledge production has, to a certain degree, been ignored. The findings from this study present information on the rhetorical effects of language in scientific publications, and this may be useful in enhancing the effective use of visuals by

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climate change researchers. The fact that a model of the language of science interpretation is developed is in itself a welcome move to those who intend to deconstruct the language of science and need to have a better understanding of the reality of clime change in Namibia. In the end, the research findings can be helpful to policymakers to have the knowledge and a better understanding of climate change discourse and be able to make meaningful policies that respond to the environmental needs of the country. The main objectives of the study were:

- To interpret and critique the rhetorical effect of visuals used in the selected science publications; and
- To develop a model for the language of science interpretation for environmental policymakers and the general populace for easy understanding of scientific discourse.

Literature Review
Language (models) of Science Interpretations
What is a model? Several scholars have attempted to define the term model. For this study, the definition by Heckelman and Dunn (2003, p.76) is chosen "a model is a representation of a state of affairs or relations." The two authors believe that such a state of affairs might be economic, mathematical, historical, literary and rhetorical. Additionally, a model could be represented in the form of model aeroplanes, toy soldiers and plastic models of every kind. To discover how these models conceptually and pragmatically function, one needs to examine them. Deducing from Heckelman and Dunn (2003) definition of a model, it can be argued that a model represents; it predicts the future; sometimes it implies narrativity; it can persuade, reveal and conceal – the issues this study is concerned with.

To illustrate the above argument, a model of an aeroplane by Heckelman and Dunn always represents the connections between its components of the whole parts. Through such a model prediction could be made to predict how an actual plane would look like. Furthermore, this same model could possess an inherent design component that is likely to remind us of some experiences of a plane, or something else which could help in the interpretation of a model. Equally the model also entails strong persuasive aspects in the public would believe, based on the model, what an airline is.

The public remains persuaded until another model of the same entity is presented. Models are tentative; in many cases they are provisional. Similar to stories and verbal constructs, models are constructed from a certain point of view. The model of a motorbike may not include any inside engineering techniques needed to drive it. This is where the rhetoric of science comes to mind. In the study models and rhetoric carried out by Heckelman & Dunn (2003) the findings are compelling. They argue that the writing component of science is deeply embedded in the language of modelling. Correspondingly, they argue that science entails brainstorming, clustering and outlining as model-building activities, nothing that this represents scientists' thinking. When scientists outline, it means they construct a model.

Several studies, focusing on the development of science models interpretations, have been similarly carried out in the area of the rhetoric of science. It has been observed that most scientific texts exhibit internal coherence structure which can easily be analysed as a tree structure of relations that bind between short segments (Reitter, 2010). Accordingly, through using rhetorical theory structure, a vector model (see Figure 1 below) was developed to help analyse a variety of textual properties, including cue phrases, parts of speech, rhetorical context and lexical changing (Vapnik, 1995). In the vector model, classifiers base their decisions on automatic knowledge acquired from sample documents. The model determines the general characteristics of the samples that belong to each assigned category or relation. According to Vapnik (1995), the vector model machine analysis delivered superior results in its many applications. Vapnik (1995) found certain factors that justify the use of vector models to analyse science texts. The vector model entails a pattern recognition problem, so it is believed that it can deal with multi-class classification. Similarly, it is observed that the vector

model has features that are interrelated, in terms of qualitative and quantitative features, as such it is designed to solve highly non-linear problems.
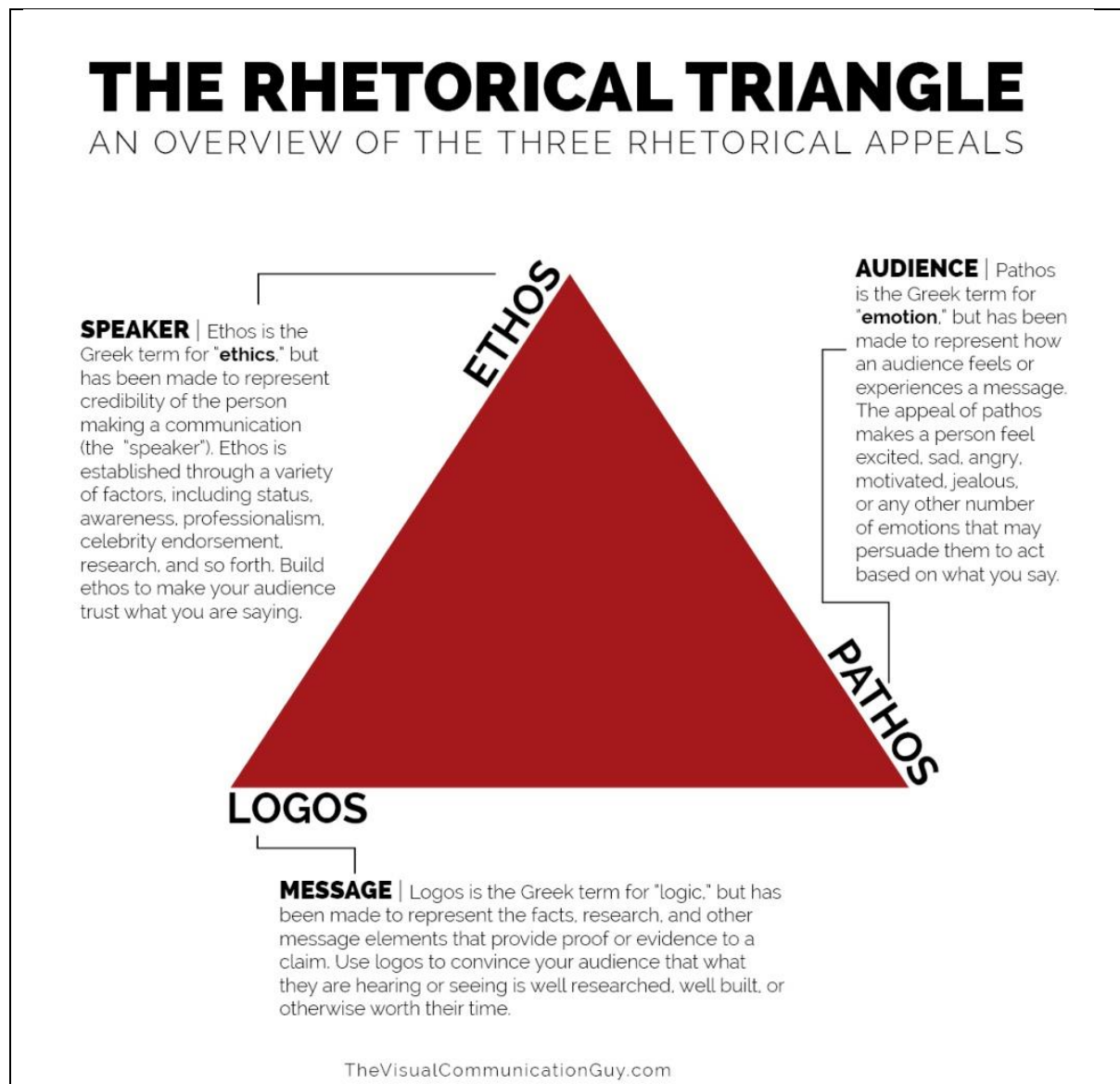

Figure 1. The rhetorical triangle (thevisualcommunicationguy, 2013)

The vector model seems to be effective in dealing with large information, it, however, lacks the epistemological and ontological interconnections between science and public interest. For example, the vector model classifiers make decisions on rhetorical relations using nuclearity (texts span nucleus). The model determines attachment preference for a text span by scoring alternate hypotheses. The model does not make philosophical provisions and pragmatic interpretations. The model is perhaps suitable for surface interpretations but seems to lack interpretation on a deeper level. Statistical analysis or rhetorical analysis is based on a rule-based chart rather than an ontological and epistemological perspective. Another model which could help explain the epistemological connections between language and science is the one developed by Aristotle, the rhetorical triangle. This model is based on the three rhetorical appeals: ethos, pathos and logos.

As can be seen in Figure 1 above, the rhetorical triangle seems to be effective in explaining social issues. The model seems to lack the aspects of 'the undiscovered reality.' The model

is better positioned to explain some aspects of science but not the scientificity of the whole concept of future knowledge. It is common knowledge that ethos makes a wider reference to what makes the situation credible. Scientists create communication by adopting rhetorical devices that make their communication appear credible. Needless to say, most scientists seem to know that credibility can take over a long period to establish. Conversely, scientists also know that ethos can easily be damaged instantly if not jealously protected.

After perusing the literature on the ethos of science communication all the information points to the fact that ethos in the language of science requires careful construction. To build ethos, scientists seem to rely on the usage of professional and appropriate language for their intended audience. Uniformly, scientists seem to design their communication professionally. They seem to use a lot of sources in their citation to create an ethos, and they also seem to use appropriate scientific jargon to express awareness among their audience. Most scientists seem to follow established conventions and paradigms of science in general. Similarly, almost all scientists rely on logical connections between ideas, and they seem to avoid logical fallacies. The triangle model encapsulates an element of the logo.

Just like ethos, the logo according to the information on the triangle is based on building a logical argument around a situation. Various pieces of literature reveal that scientists use statistics and other various facts to build an argument. Scientists seem to do this by making constant reference to the research in support of their claim. Furthermore, they seem to rely on logical connections between concepts by being specific.

Pathos in science entails the use of images to wake emotions. Unlike in other areas of studies, most scientists seem to avoid using humour, emotionally charged words or places to evoke enthusiasm when communicating their findings to their audiences. Despite the limited use of emotional language, science seems impossible to detach itself from images scientists use to argue their case. Rhetoric goes beyond just using emotional language, any form of argumentation intended to persuade the audience, be it emotional or otherwise, is equally regarded as pathos.

Communicating Scientific Discourse
Communicating scientific discourse seems a daunting task. To most scholars communicating scientific discourse, let alone climate change, can be an intimidating endeavour. Some people may wonder how communicating climate change differs from communicating other environmental problems, commercial challenges, risks, policy problems, and behavioural change issues. Moser (2010) even remarked that why it is that the insights from other communication experiences cannot simply be applied to climate change, asking if a separate area of scholarly attention for climate change is necessarily needed. Perhaps apart from the institutional makeup and professional challenges, there is probably something like the climate change problem and also how human beings interact with the climate that makes it more challenging to communicate than other environmental challenges. Yieldingly, Moser (Ibid) reluctantly agreed that several challenging traits truly make climate change a difficult issue to deal with. Clearly, from these remarks, it can be argued that climate change perhaps requires special communication scholarly attention. In fact, climate change transcends different disciplines. Labosier and Fay (2019) noted that climate change is a complex problem spanning the realms of science, economics, law, policy, ethics and communication.

Indistinguishably, the causes of some of these traits of climate change can easily be viewed by simply looking at the sky. These traits do not have a direct impact on health implications, this way, the pollutants causing the problem are different from many other air and water pollution problems (Moser, 2010). Equally, Moser contended that these traits are influenced by the geographical distance between cause and effect, arguing that emitting greenhouse gases do not lead to a noticeable and visible impact.

The complexity of communicating climate change to the public by scientists was made unproblematic by Halliday (1998) who developed a theory in which an argument was advanced about how and why scientific writing differs from other writings. In that theory, Halliday explained that scientific discourse exploits a capacity of a language that is used daily without realising it. The theory refers to this argument as grammatical metaphors. Attempting to explain the theory, Halliday simply and briefly refers to it as the process whereby one thinks theoretically. By theoretically, scholar meant the process where one experiences and construes the experience in a language – that is telling someone else about one's experience. However, what is noteworthy is that the process of the 'experience' may entail over an extended period in which scientists engage in experimental experiences that they may construe and re construe in a language. Revees (2005) equally agreed that, apart from experimental, sometimes one may observe the process artificially, in the texts one writes to communicate one's findings and ideas. These texts may entail grammatical metaphors that conveyor mirror their construal process in the scientists' thinking, but they (scientists) may also support the arguments the writers are making (Reeves, Ibid). When scientific writers change verbs and adjectives into nouns, they tend to create objects out of the process, qualities and attributes (Halliday, 1998).

Methodology

A qualitative case study research design was utilized as it makes provision for an in-depth study of the phenomenon. The philosophical underpinning informing this study is the interpretive paradigm as it seeks to understand the dynamics of the rhetoric of the models on climate change. The method has been adopted because it is better suited to provide an in-depth understanding of the rhetorical analysis of scientific publications on climate change in Namibia. Arguably, by employing the qualitative approach, the emphasis is to discover and understand the epistemological dynamics of models of the rhetoric of science.

Rhetorical interpretations of scientific models on climate seem complex, as such they require a research design that enables such complexity to be analysed and explored to provide a better understanding of how scientists use persuasive arguments to win the hearts and minds of their audiences. Qualitative researchers argue that there are elements of reality that are impossible to quantify (Silverman, 2000). Accordingly, qualitative research entails the subjective understanding of social reality as opposed to number descriptions.

Therefore, this study used the qualitative methodology of desktop research. Three scientific publications were purposefully selected. Visuals extracted from the sources were listed and subsequently analysed accordingly.

Findings and Discussion

Models are tentative; in many cases they are provisional. Similar to stories and verbal constructs, models are constructed from a certain perspective. The model of a motorbike may not include any inside engineering techniques needed to drive it. This is where the rhetoric of science comes to mind. In the study models and rhetoric carried out by Heckelman and Dunn (2003) the findings are compelling. They argued that the writing component of science is deeply embedded in the language of modelling. Correspondingly, they argued that science entails brainstorming, clustering and outlining as model-building activities, nothing that this represents scientists' thinking. When scientists outline, it means they construct a model.

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knowledge acquired from sample documents. The model determines the general characteristics of the samples that belong to each assigned category or relation. According to Vapnik (1995), the vector model machine analysis delivered superior results in its many applications.

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Another model which could help explain the epistemological connections between language and science is the one developed by Aristotle, the rhetorical triangle. This model is based on the three rhetorical appeals: ethos, pathos and logos. As can be seen above the rhetorical triangle seems to be effective in explaining social issues. The model seems to lack the aspects of 'the undiscovered reality.' The model is better positioned to explain some aspects of science but not the scientificity of the whole concept of future knowledge. It is common knowledge that ethos makes a wider reference to what makes the situation credible.

Scientists create communication by adopting rhetorical devices that make their communication appear credible. Needless to say, most scientists seem to know that credibility can take over a long period to establish. Conversely, scientists also know that ethos can easily be damaged instantly if not jealously protected.

Publication 1: "Climate change counts mapping study: Namibia report" (Heila & Urquhart, 2014)
The publication opens with the claim that southern Africa is one of the region's most vulnerable to the impacts of climate change. Furthermore, the publication argues that climate variability and vulnerability to extreme events such as floods and drought seem high, and this constrains food security and development. To contextualise its argument, the publication presented models to illustrate the variability and vulnerability of the climate phenomenon to persuade the readers.

The presented models serve the rhetorical function of persuasion. Thus, rhetoric should be viewed as an effort to elucidate the significance of discourse, advocacy, and orientation of arguments through models toward the truths at a certain time and space. Respectively, rhetoric paves the way for understanding sophisticated and complex model interpretations. Just because models are interpreted rhetorically, it does not mean that rhetoric is an empty communication as it is always regarded by most none rhetorical scholars, but rhetoric goes beyond this one-dimensional understanding. Notwithstanding Plato's orientation to rhetoric which views rhetoric as a form of deceit, rhetoric in essence is a multifaceted term that entails multiple elements of persuasion, it does not mean that all models, visuals and arguments are meant to trick the public, or that somehow Namibians have been deceived into believing that climate change is a hoax. Certainly, the rhetoric goes further than this. Rhetorical analysis of the visuals and models presented provides a platform to think through how climate change affects everyone, and how it should be dealt with, and how solutions should be sought, and how one should navigate the politics around it.

In that order, like it was argued before in the literature review, a climate is characterised by physical and social compositions, which demands human intervention. For that reason, the writer or the publication has presented the models as a way to persuade the public and the policymakers to work together and solve the menace of climate change. It should equally be argued that rhetoric, through the model presented, brings to the fore the knowledge that whatever is done to reduce the effect of climate change requires working together. Understanding national and international issues on climate change requires dialogue, and this dialogue is guided by networking and consensus. To substantiate the above argument, Image 1 (see Figure 2 below) below explain the networking phenomenon.
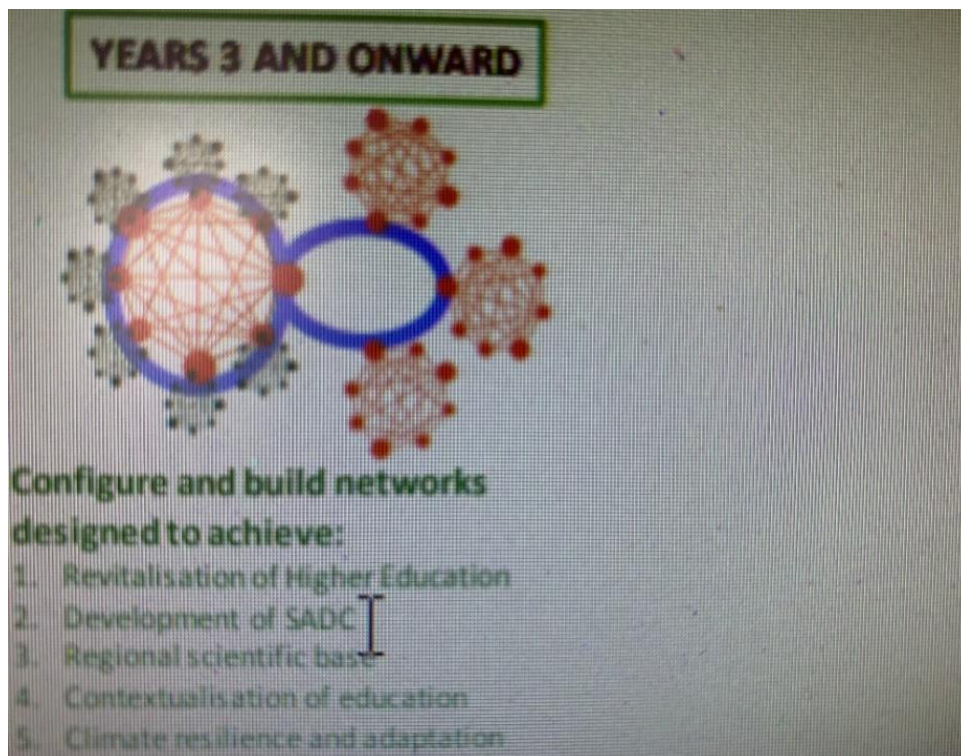

Figure 2. Image 1: SARUA Climate Change Capacity Development Programme (Heila, & Urquhart, 2014).

The image above indicates programmes and actions as per the knowledge co-production framework to establish and grow collaborative networks, to solve the climate change problem. It can be seen that the publication seems to have achieved its goal of demonstrating to people how collaborative networks can help alleviate vulnerability.

In its quest to persuade the readers, the publication has again presented the climate change, resilient development model, to help explain some possible ways to mitigate climate change. The author of the model seems to create an impression that the presented model is a fact, and as such should be implemented to mitigate climate change. The rhetorical function of the presented model is the response to the publication's claim that Namibia being in Southern Africa, the region considered as the most vulnerable to the effects of climate change, would likely experience extreme events such as flash floods, land degradation, loss of biodiversity and high drought – constrains food security and much-needed development. Thus, the readers are reminded that unless resilient measures are put in place, climate change would likely have catastrophic effects on social composition. Through this way, the public and the policymakers are persuaded to believe the model.

Fascinatingly, again HIV/AIDS and malaria are brought in the discussion as tools to convince the readers about the threat climate change poses. For example, the publication claims "Reduction of Namibia's structural poverty is further challenged by health threats such as malaria and HIV/AIDS. Climate change will compound many of these interlinked problems for national livelihoods, which are often based on subsistence agriculture (p. 6)." Health issues such as HIV/AIDS and malaria are foregrounded in the discussion to attract the attention of the readers. The two health issues are being used as rhetorical rallying points to canvass support from the public and the policymakers alike. Equally, the country's high vulnerability to climate change is rhetorically being used to heighten the appeal to the readers and the public at large that climate change is a serious threat and ought to be dealt with as soon as possible.

In addition, by using other social challenges in the discussion about the impact of climate change, the publication intends to draw attention to the seriousness of the risks climate change is likely to pose. Also, the publication intends to persuade the public that the existing problems such as HIV (Human Immunodeficiency Virus) and AIDS (Acquired Immunodeficiency Syndrome), which are considered as serious problems in the various societal structures, could easily be exacerbated by climate change. Broadly, the publication's use of developmental issues in the discussion about climate change could also be argued that the author wants to elevate climate change to the level where the readers or the public should not view it as a simple environmental problem, but rather take it as a critical developmental challenge that merits a national and international response. Once the status has been elevated, the author could then argue that climate change has the potential to compound developmental pressures experienced by the inhabitants. To substantiate the argument above, the author has presented Image 2 (see Figure 2 below) to explain sustainable development in the context of climate change.
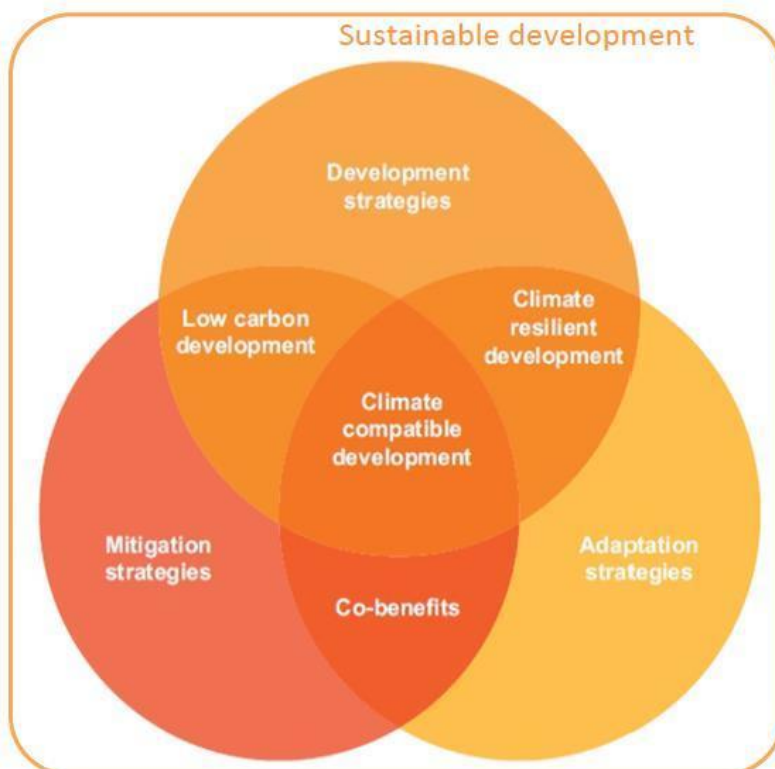

Figure 3. Image 2: Conceptual framework for Climate Compatible Development (Adapted from Mitchell & Maxwell, 2010)

Overall, the publication's images seem to be effective in their persuasive move. The models presented have the potential to persuade the readers as explained before.

Publication 2: "Climate change strategy and action plan" (Ministry of Environment and Tourism, 2009)

Publication 2 claims that climate change stands out as one of the major challenges of the 21st century that threatens progress towards the achievement of national and millennium development goals (MDG) of various countries including Namibia. Furthermore, the publication contends that despite many challenges, it seems much remains broadly undisclosed vis-à-vis climate change. The publication assumes that many people do not understand the meaning and implications of climate change.

Moreover, the publication opens with the background to the study. It claims that climate change effects are predicted at global, regional and national scales; this is the publication's way to establish credibility with its potential readers. The publication highlights how susceptible Namibia is to climate change and establishes the scene for the need for climate change adaptation and mitigation. Equally, the background to the study outlines the rationale for carrying out the suggested study. This is in line with the dimension of scientific discourse in the invented dimension mentioned in chapter two, where it was argued that invented dimension has nothing to do with information being cooked up or made up, but the term merely refers to how scientists do not necessarily ramble on about their findings and theories but rather how they engage in coherent argumentation and presentational theatrical performance. The performance, it was argued, entails inter alia, recognising the appropriate purpose for the argument, pinpointing the exact position of departure – the writers situating themselves within the existing body of knowledge, and sticking to orthodox criteria for reasonableness and usefulness, as a form of persuasion.

To further appeal to the potential readers, the publication on its cover depicts a computer-generated model that might appeal to the readers since it shows the limited green area in the northern part of the country, and the rest of the country is indicated in brown a sign that the area is dry. However, the computer-generated model can easily be manipulated. The designer can manipulate the map and turn it brown if he or she intends to persuade the readers that the vegetation is fading if nothing is done to mitigate climate change effects. Similarly, the model can be manipulated to turn the whole map into green as a way to deny climate change. In Figure 4 below, Image 3 indicates how a computer-generated model can be manipulated.
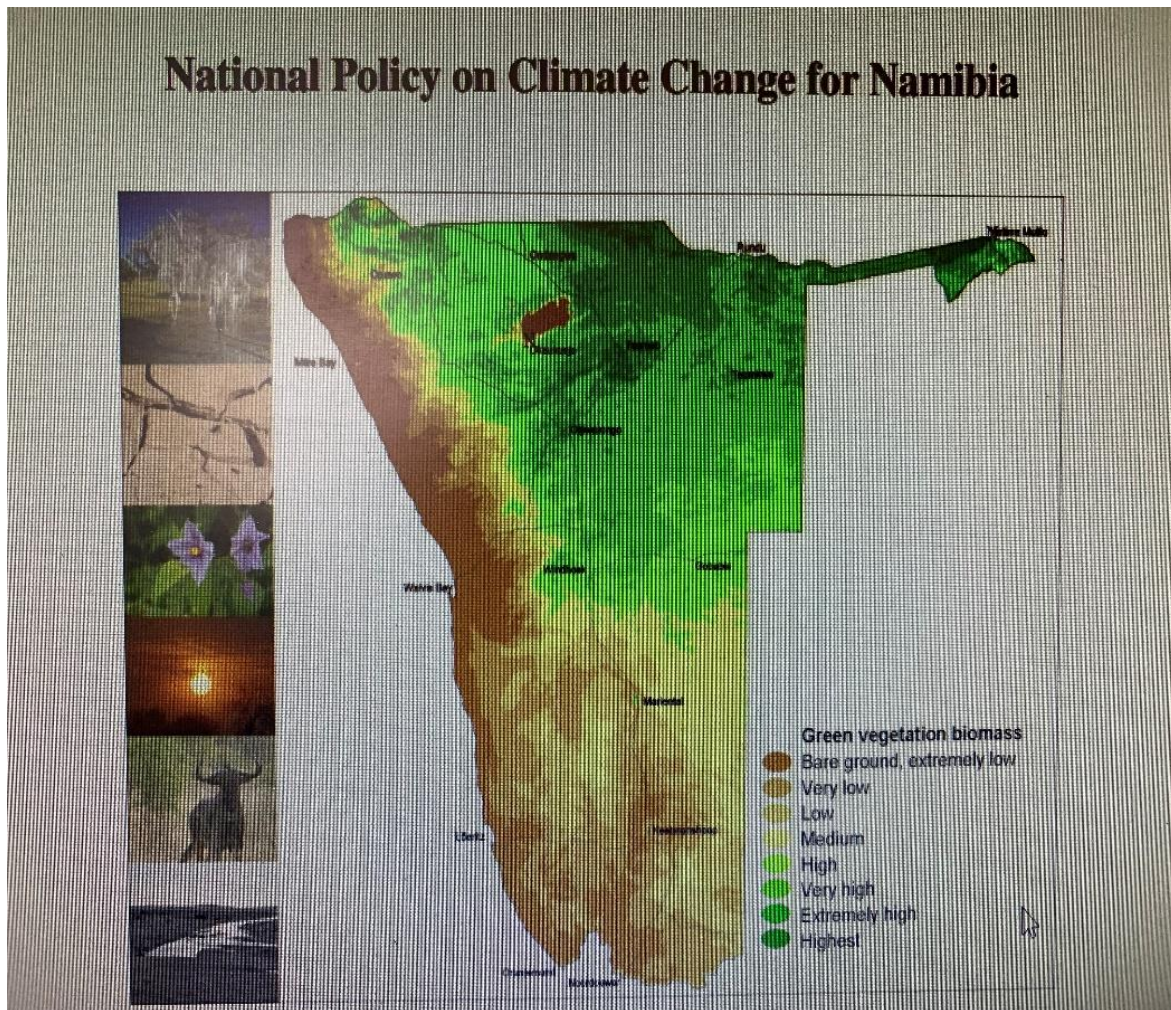
Figure 4. Image 3: Manipulated computer-generated model (Source: National Policy on Climate Change, 2010, p.1)

Climate change is often projected in the forms of graphs, charts and other visualisations of computerised simulations. At times because of these visual manipulations, some readers tend to disagree with the scientific findings while a good number of them maybe convinced. As a result, some people may accept the threat of climate change as an exigency and argue for and against the response to take to neutralise the threat. To further strengthen its logical rhetorical appeal to the readers, the author of the publication understudy passionately appeals to the readers by reminding the public that logically Namibia's geographical location requires intervention against climate change. To substantiate the above argument, the publication reasons:

> *"Namibia is very vulnerable to effects of climate change due to its geographical location, variability in patterns of climate as well as due to socio-economic factors. Climate change impact predicted for Namibia will adversely affect the extent and the speed at which long term, medium and even short-term national development goals will be achieved" (p. 9).*

The rhetorical aim of this reasoning is to establish the position and orientation from which an argument could be driven, as far as persuasion is concerned. The author's claim that Namibia is "very" vulnerable is telling. Again, the rhetorical analysis of this argument points to the direction that the author is trying hard to convince the readers that Namibia cannot afford to delay further because its location dictates that action against climate change should take place

now than later. As can be seen from the above arguments, the arguments about climate change are mostly rhetorically constructed, and as a result, can equally be deconstructed. Therefore, this is the area where authors push their agenda through persuasive means.

Rightly so, climate change is increasingly acknowledged as a threat facing human societies in the 21st century, but the manipulation of the visuals and models for convincing purposes is compelling. What should be looked at while trying to understand this phenomenon is how the conversation about climate change in a form of visuals and models, resonates in the public discourse. Extraordinarily, various researchers dealing with climate change seem to embrace more visuals and models as forms of interactional approach to science and society relations than ever before. It is almost agreed upon like it is argued before; by various scholars that despite being shrouded by uncertainties as to its nature and manifestations, climate change is an authentic phenomenon that is likely to inevitably affect humanity in the foreseeable future, thus requires everyone's intervention.

Importantly, Vincent (2004) was very pragmatic in claiming that growing interest in climate change seems to have placed focus on the attention of inter-relationships between nature and human systems. Just like Vincent, various scholars and experts appear to concur that the rhetorical interpretations of climate using various models and visuals based on previous analogues of climate variability, seem to lack human-science connection as the focus is on manipulation of the model to achieve persuasion. Conversely, it is this kind of top-down approach which brings simulation and failures to take into account the differential vulnerabilities of human populations to those environmental dangers. As a consequence, evaluating the likely impact of climate change is complex.

However, despite the above argumentation, the publication is effective in its persuasive move as it addresses the overwhelming evidence of global warming. The publication anchors its climate-related argument in the likely consequent effects of climate change on Namibia, to persuade Namibians or the readers that Namibia must take action against climate change. In addition, the approach to visuals and model rhetorical interpretation appears to have come out as containing also numerous bottom-up studies of how humans mediate climate change to produce impact. Surely, this area of rhetorical enquiry indeed confirms and marks one of several promising research areas of nature-society relations. Desolately, the development of the study seems to have been impeded, like it is stated before, by a variety of paradigms and conceptual approaches, uncoordinated empirical studies and as a result, lacks comparability on the broader scale of model interpretations. It is against this background that this study, therefore, fills an academic demand for the examination of climate change publications.

The appeal made through the model presented is seemingly used as a national strategy for climate change adaptation and mitigation and urges the public to take a necessary course of action. Through the model, the public is urged to take action that will lessen the threats from climate change and contribute to the necessity for cost-efficient means of addressing climate change. The publication persuades its readers that the strategy that would be adopted would be effective and should be trusted, suggesting *"The national climate change strategy will be a necessary tool to facilitate climate change adaptation and mitigation to reduce its impact on socio-economic development of Namibia"* (p. 9). Again, socio-economic development has been used by the author as a rallying point to drive an argument home, at the same time reminding the readers that to promote development and reduce poverty, the national climate change strategy should be implemented. In case the readers doubt the authenticity of the proposed national strategy to address climate change, the publication has roped in the constitution to cement its argument, insisting "This is enshrined in the constitution of Namibia and articulated in the vision 2030" (p. 10).

Traditionally, climate change was viewed as a physical phenomenon that was observed, quantified and measured, and was mostly understood by scientists rather than ordinary

people. Nevertheless, Hulme (2009) observed that nations have been increasingly confronted with the observable realities of climate change and knowledge of the repercussions that scientists claim lurking shortly and that climate change has turned from being a physical phenomenon to being a social phenomenon, as such making it necessary for the implementation of national strategy. Being a social phenomenon, writers who write on the subject of climate change have adapted to the situation in the manner that many write appealing to their followers through social moves that resonate with the public. Since human beings have become persuasive active agents in the moulding and reshaping of physical climates the world over, using persuasive moves that appeal to the people is an effective way to persuade them to deal with climate change. Overall, the image is likely to have a significant impact on potential readers.

Publication 3: "Climate change impacts on Namibia's natural resources and economy" (Macgregor, 2008)

Publication 3 presented model simulations for Namibia. The publication has employed computable general equilibrium (CGE) model simulations for Namibia. Explicitly, the publication claims that climate change is likely to worsen the dry conditions already being experienced in southern Africa, warning that when rainfall comes it would likely lead to erosion and flood damage. Remarkably, despite the early predictions, the CGE model had little influence on policymakers in southern African countries (Macgregor, 2008). The CGE model shows that in two decades to come, yearly losses to the Namibian economy could easily go up to more than 6% of the Gross Domestic Product (GDP). The model was seemingly used to urge policymakers that if climate change is not mitigated, there would be serious repercussions. The publication further revealed that poor people would be the hardest hit, with possible job losses and a decline in wages. Accordingly, the publication urged policymakers to take measures that mitigate climate change. It can be sensed that the model was probably meant to speed up the process of persuasion as the designer could effortlessly manipulate the model to suit the agenda of the publication, that of urging people to take drastic measures to curb climate change. Finally, the publication seems to have achieved its purpose of persuading the readers about the possible danger of climate change.

As can be seen from the arguments above, climate change computer-generated models have the potential to carry meanings that are persuasive as they can simply be manipulated to suit the intention of the author. The rhetorical function of the computer-generated model is to convince the public to treat the model as a fact about climate change. If these computer-generated models are anything to go by, climate change appears to be changing our objective worlds and also altering the social world of things through the manipulation of the models. Therefore, computer-generated models also require meticulous rhetorical interpretations to arrive at possible independent solutions to deal with it.

This conclusion is in line with Wright and Mann (2013) who argued that rhetorical analysis is essential for examining and drawing attention to climate change as a socially and politically constructed phenomenon, closely intertwined with the ideological assumptions underpinning collective sense-making processes, be it in text or visuals. Rhetorical analysis of visuals and models appears to become increasingly significant to understanding how science publications use rhetoric to win the hearts and minds of their followers.

Manipulation of Climate Change Models

As a whole, rhetorical analysis of visuals and models of climate change can serve as a sign that visuals and models can be represented through the manipulative models of choice made by the author, without necessarily relying on the text. Befitting, rhetorical analysis of visuals and models also helps uncover authority within the presented models, and that authority can be used to the advantage of the publication to argue for a point of view. From this vantage point, rhetorical analysis techniques of visuals and models have the potential to reveal a wide range of access to interpretational discourse as a way to persuade the public.

Thus, climate graphs and visuals raise interesting questions for rhetoricians of climate change science scholars; this is so because the authenticity of data based on speculation and estimation tends to be puzzling and often results in questionable data in most models. From this observation, it can be argued that climate writers have to deal with their ethos and professional ethos to produce graphs and visuals that are accurate for public use. Furthermore, authors who produce these graphs and visuals, according to Walsh (2010), belong to political parties. It is this political involvement that tends to lead to the discrediting of their scientific findings. Finally, this paper concluded with the analysis of the models developed and discussed by various scholars.

Accordingly, through using rhetorical theory structure, sometimes models are developed to help analyse a variety of textual properties, including cue phrases, parts of speech, rhetorical context and lexical changing (Vaprik, 1995). In this study, it was found that both the deficit model and contextual model lack provision for natural and political space for manoeuvres, as models tend to be time-bound – contrary to Gross (1993) who argued that rhetoric in speeches is timeless.

The study revealed that models seem to be effective in dealing with large information; they, however, lack the epistemological and ontological interconnections between science and public interest. For example, the vector model classifiers make decisions on rhetorical relations using nuclearity (texts span nucleus). The model determines attachment preference for a text span by scoring alternate hypotheses. The model does not make philosophical provisions and pragmatic interpretations. The model is perhaps suitable for surface interpretations but seems to lack interpretation on a deeper level. Statistical analysis or rhetorical analysis is based on a rule-based chart rather than an ontological and epistemological perspective.

This study has also resulted in the development of a new model of the language of science interpretation.

Language Filter Model of Science Interpretation
The language filter model of science interpretations shows that knowledge exists in space and time. Debatably, there was no language before the existence of the first human being. From relative obscurity, it seems language was possibly developed by human beings who may have existed in time. Human beings might have used language to interpret knowledge and perceptions. As argued before, language rests on unstable symbols of meaning, written and spoken forms. As such, the truth can be revealed through spoken or written form, compromising objectivity.
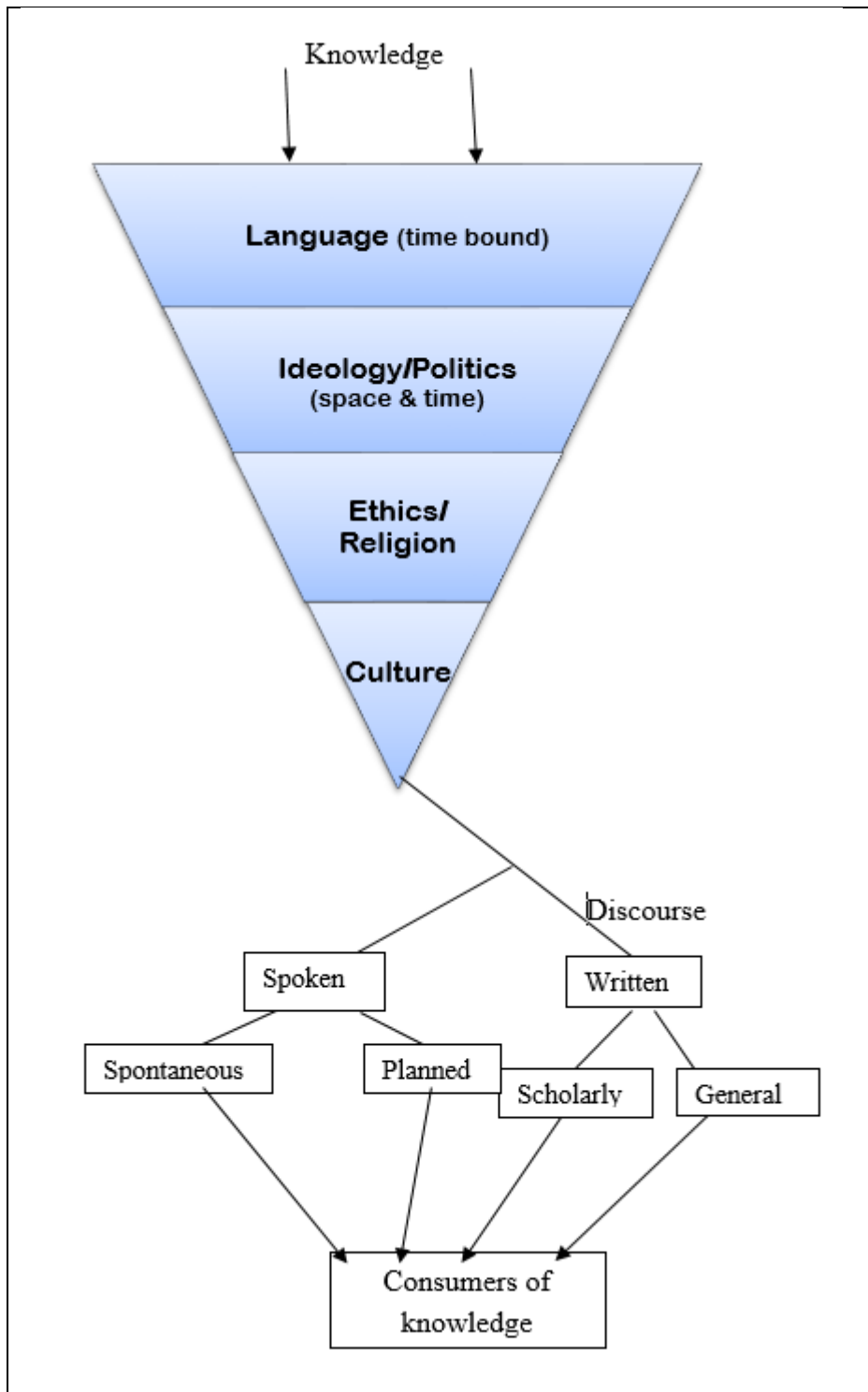
Figure 5. Language filter model of science interpretation

The language filter model of science interpretations is intended to demystify the language of science. As illustrated in Figure 5 above, the model shows how knowledge, as perceived by scientists, goes through different stages before it reaches the consumers of that knowledge. Subsequently, the perceived knowledge goes through the language interpretation and in the process the language is affected by time. For example, a certain language can be used to interpret that perceived knowledge but later that language dies (Latin – as an example). Of course, it is common knowledge that language derives its meanings from the social context within the period of usage and as such interpretation is also based on social contexts. The

social contexts are likely to be limited to the time when the language is still in use. Inadvertently, when one uses another language to interpret the perceived knowledge, social contexts and culture of that language would most certainly have a profound impact on the interpretation of that knowledge.

Moreover, after going through language interpretation the perceived knowledge goes through an ideological or political interpretation. For example, the issue of climate change (knowledge) seems to play out along party lines. A case, in particular, is an American scope for explaining how views about the reality of climate change are seriously affected by one's political and ideological views (Dunlap, 2011; Hamilton, 2011). The two parties, Democrats and Republicans, both self-reported their understanding of climate change and their reports demonstrated an increase in concern about climate change for the Democrats, but a little concern for the republicans (Dunlap, 2011).

The model further shows how the perceived knowledge goes from ideological/ political interpretation to ethics and religion. To contextualise the above information philosophically, one is tempted to argue that what we know of the world today is that it exists of a developing set of human understandings and partial cooperation. The world appears to entail a considerable number of conflicting interpretations of reality. We know for a fact that a bad conflicting reality creates problems for the people who duly have rested interests in some interpretations over the other. Thus "each society evolves a body of rules by which one version of reality may be legitimated and the other competing versions desecrated" (Wander, 2009, p. 226).

Wander (2009) postulates that there was a moment in time when religion viewed reality or knowledge and secured the principle rules for its validation through God on earth and via interpretation of the holy bible. So, any views that were seen as opposing the bible were viewed as an abomination or disrespecting to the living God. Equally, science today has its reality: any opposing views that do not conform to standardisation, compartmentalisation and systematicity are viewed as unscientific. Therefore, religion plays a significant role in the interpretation of perceived knowledge.

Culturally, any knowledge perceived by the scientists has to go through a sieve. As argued before, climate change entrance into public discourse or domain is an open secret for most scholars (Gross 1993, Hulme 2009, Pera 1994). Traditionally, climate change was viewed as a physical phenomenon that was observed, quantified and measured, and was mostly only understood by scientists (Hulme, 2009). Hulme (2009) observes that nations have been increasingly confronted with the observable realities of climate change and knowledge of the repercussions that scientists claim lurking in the future and that climate change has turned from being a physical phenomenon to being a social phenomenon.

Regardless of how scrupulous scientists can be in describing the observable elements of phenomena, cultural meanings and cultural bias are likely to subvert the aim of objectivity. This is learned from social sciences that human beings are fallible and so does the language they employ. Because of the above challenges, it becomes increasingly complex for scientists to rule out biases even from the conceptual stage of their investigation. The production of scientific knowledge, therefore, rests on the notion that knowledge becomes accepted by the public as a reasonable interpretation of what transpires in Nature.

As seen from the arguments above, climate change has the potential to carry different meanings and it implies different courses of action, depending on the various vantage points one stands. For Aristotle, it was more of oral culture and male culture to see the available means of persuasion ubiquitously in each case, and effectively utilise those means with the desire of reinforcing conviction and deed.

Thus far, the present study looked at what rhetoric is and how it is moulded through the discussion about climate change. Equally the present study demonstrated the significance of rhetoric and how rhetoric functions in the analysis of climate change publications in Namibia. Furthermore, the analysis of the texts in chapters two, four and five revealed that the premise of discussions and argumentations set the agenda on climate change.

Moreover, the analysed publications demonstrated connections and relationships of ideas and knowledge about climate change. For example, an increase in atmospheric pressure and temperature is connected to climate change, which in turn is connected to human activities. Similarly, the analysed publications appeared to have changed the worldview of the readers through the manipulations of data, particularly the visuals and models in chapters four and five respectively.

Finally, the present study underscored the value of the qualitative method approach adopted in enabling an in-depth understanding of the scientific and dynamic context of climate change in Namibia. The flexibility of the qualitative methodology made it effortless to interpret documents and draw conclusions, thereby adding to the value of the data collected. The exploratory nature of the study allowed this writer to infer meanings and draw conclusions. In consequence, the qualitative approach provided a wider understanding of the dynamic of climate change phenomena in Namibia. Apart from contributing to the broader debates on climate change, this present study contributed knowledge to a practical gap in the qualitative approach on the interpretation of documents.

Conclusions

Scientists have demonstrated connections and relationships of ideas and knowledge about climate change. For example, an increase in atmospheric pressure and temperature are connected to climate change, which in turn is connected to human activities. The study revealed that models seem to be effective in dealing with large information; they, however, lack the epistemological and ontological interconnections between science and public interest. The model shows how knowledge as perceived by scientists goes through various stages before it reaches the consumers of that knowledge. The perceived knowledge goes through language interpretation, and language is affected by time. Inadvertently, when one uses another language to interpret the perceived knowledge, social contexts and culture of that language would most certainly have a profound impact on the interpretation of that knowledge. Afterwards, it goes through politics/ ideology. Also, the knowledge goes through Religion – the God concept. Finally, it goes through culture before it gets to the consumers. The finding is in line with Heckelman and Dunn (2003) who noted that a model represents; it predicts the future; sometimes it implies narrativity; it can persuade, reveal and conceal – the issues this study is concerned with.

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