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CONSERVATION PHOTOGRAPHY

EVALUATING THE IMPACT OF PHOTOGRAPHIC IMAGES IN CONVEYING CONSERVATION RELATED MESSAGES



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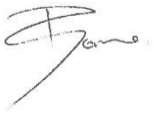
This research report is submitted in partial fulfilment of the requirements for the degree of Master of Science in the field of Environmental Science at University of the Witwatersrand, Johannesburg.

February 2018

DECLARATION

I declare that this report is my own unaided work. It is submitted for the degree of Master of Science in the field of Environmental Science at the University of the Witwatersrand, Johannesburg

It has not been submitted before for any other degree or examination at any other university.



Prelena Soma Owen

28th day of February 2018

ABSTRACT

Species extinction and environmental threats continue to be a concern for conservation scientists. A limitation to reaching conservation targets is the challenge in communicating scientific findings to the general public. Conservation photography is increasingly acknowledged by both scientists and conservationists as an effective tool in communicating biodiversity losses and environmental concerns.

This study explored the impact of photographic images in delivering conservation messaging on a purposely selected sample group and tested if demographics played a role in image interpretation.

The study found that photos of charismatic animals did not rank high in delivering effective conservation messages. Respondents chose images that contained graphic content, with “shock value” as having the strongest conservation messages. This contradicted general expectations. The study also found that 50 % of the images used in the study showed statistical significance in the manner in which they were interpreted by Black and White respondents, suggesting that demographics played a role in image interpretation. Both these findings have important implications for conservation communication.

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1 CHAPTER ONE – INTRODUCTION

1.1 Overview of the research problem

Conservation scientists view the loss of biodiversity as one of the most critical environmental problems that the planet is currently facing (Ceballos *et al*. 2015). Pimm (2008) believes that climate change, habitat destruction and anthropogenic stressors are causing extinction rates that are 2 to 5 higher in magnitude above rates recorded in history, and that this is likely to catapult the Sixth Mass Extinction.

Biodiversity as defined by United Nations Conference on Environment and Development in 1992 is, "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems". Any losses or declines in biodiversity are likely to have impacts on an ecosystem's function, services and sustainability (Hooper *et al*. 2005). As human lives are inextricably linked with biodiversity, its protection is essential for survival. As biodiversity losses increase at an alarming rate as evident from the International Union for Conservation of Nature's (IUCN) Red Lists, the need to have effective conservation communication strategies becomes increasingly more important. In recent years, photography has become a vital tool in creating awareness around biodiversity and its conservation. There is evidence that the use of images can have an impact on attitudes, perception and behaviour towards Nature (Kalof, Zammit-Lucia & Kelly 2011). It is therefore imperative to understand how images are perceived by the public in terms of their conservation content to ensure that the right conservation messages are delivered effectively to targeted audiences.

In attempts to prevent further losses to biodiversity conservation campaigns try to encourage pro-environmental behaviours, defined by (Kollmuss & Agyeman 2002) as a conscious attempt to minimise the adverse effects of one's behaviour or actions on the natural and built environment. Almost all conservation campaigns use images to convey such messages, creating an urgent call for studies that evaluate the effectiveness of images in communicating conservation messages. To my knowledge, studies of this nature have not been done before.

The problem is further exacerbated by the exclusion of the public from scientific communication of important findings relating to biodiversity losses and environmental issues. While scientific findings are important, they are unlikely to produce positive attitudes and behavioural changes towards environmental issues in isolation

(Jacobson, McDuff & Monroe 2007). Part of the reason is that scientific findings are not easily communicated to the policy makers and the general public in a manner that they understand to effect positive behavioural change. Collaboration with partners using other platforms to share scientific findings and biodiversity information can result in more effective changes in behaviour (Opermanis, Kalnins & Aunins 2015). (Opermanis, Kalnins & Aunins 2015) proposed linking environmental communication and the arts for effective learning and information sharing through visual stimulation, such as photography.

While nature photography depicts elements of the natural world with a focus on the aesthetic value of the photo, conservation photography is a combination of photographic expertise combined with an understanding of environmental issues and a focus on conservation (Mittermeier 2005) . In other words, conservation photography is "the creation of images to serve the purpose of conserving Nature (Mittermeier 2005). The power of imagery is demonstrated Nick Brandt's iconic images of tusks with elephants and tusks without elephants (Figure 1.1).



Figure 1.1 Nick Brandt's iconic images

The visual echo of the tusks with and without the elephants resulted in public outcries that catapulted global anti -poaching efforts. Brandt is a dedicated elephant activist. He uses his images to highlight the plight of East African elephants, using proceeds of the sales of his images to supports 300 rangers who protect elephants in East African against poachers.

The field of conservation photography as an effective communication tool has gained momentum over the years. In 2005, over forty photographers, many of them scientists who were active in conservation, convened in Alaska for the first conservation photography symposium. The idea was conceived by Christina Mittermeier and lead to the formation of the International League of Conservation Photographers (iLCP) whose

mission is to further environmental and cultural conservation through ethical photography. Fellows of iLCP are dedicated conservation activists who highlight environmental issues through the use of photography (Veríssimo *et al*. 2013).

It should be emphasised that while flagship status of animals and animal charisma have been the focus of many scientific studies, very little literature could be found on conservation photography and its value in conservation efforts. There is also a scarcity of literature on the theoretical foundations of demographics cognition as an approach to science communication and none, to my knowledge, on the effectiveness of imagery in conservation campaigns. Even less literature is available on the effects of the cultural aspects of demographics on image interpretation. None were found on population groups in Africa. This suggests that there is an opportunity for the study to be expanded to explore these aspects in more detail.

The media and more recently, social media networks have been instrumental in conveying environmental awareness campaigns. Historically flagship status, anthropomorphism and charisma of animals have been favoured over the less attractive "realties" of endangered species through these mediums. I propose that this has affected attitudes towards the less attractive species as print and electronic media affect how animals are socially constructed. Indicative results of the study display this trend, implying that media and social network forums need to reconsider how they frame environmental messaging. As the interpretation of photographs is highly subjective, the intended conservation message could be lost in the interpretation process or the manner in which it is contextualised. In order to be effective, the stewards of conservation need to take into account that people interpret images differently and that demographics could play a role in that interpretation. In understanding how people react to and interpret images it is possible to leverage this for predicting what type of images would be most effective in communicating conservation related messages and to whom.

1.2 Interdisciplinary research

The challenges facing biodiversity conservation and conservation communication are vast and complex and calls for alternate study methods to address these problems. Conservation scientists possess discipline –based expertise which is important for conservation management but such knowledge is often partitioned per discipline, limiting the way a problem is defined which tends to hamper options for solutions (Clark 2001). Few would disagree that these challenges cannot be dealt with from a

single disciplinary perspective alone. A broader understanding of conservation science is emerging that recognises the role of social sciences, humanities and other disciplines outside environmental science as not just an optional complement but as a vital part of the conservation narrative (Bennet *et al.* 2017). This is recognised as multi or interdisciplinary research and is defined as research that surpasses disciplinary boundaries (Bridle *et al*. 2013). Interdisciplinary research uses a conceptual model that adopts the study design and methodology from various disciplines where the perspectives of the involved disciplines are considered throughout the phases of the research process (Aboelela *et al*. 2007).

Historically, the environmental education systems did not allow for reciprocation between disciplines and scientific phenomena were not viewed from different perspectives. However, research landscapes continuously change and development towards a more interdisciplinary focus is expected in the future. In recognition of this several universities such as, University of Karlsruhe in Germany, University of Paderborn, Texas Tech University, Syracuse University in New York, University of Tokyo, Cornell University and the University of Witwatersrand have revised environmental studies curricular to include program- dedicated interdisciplinary courses. The need for interdisciplinary approaches was further highlighted in a 2014 study in the United Kingdom by the Research Excellence Framework. When academics were asked which cases of research had the most compelling impacts outside academia, 80% were found to be interdisciplinary in nature (Nature.com website).

There were several reasons why I deviated from the traditional scientific approach and opted for an interdisciplinary approach in this study:

1. Conservation issues are complex and cannot be limited to one discipline
2. Majority of our ecosystems are dominated by humans and social elements need to be considered when trying to address conservation problems and solutions
3. I found that most scientific papers were too tedious for the general public to understand and I wanted my research results to influence practice at grassroots level. Hence my results reporting structure deviated from the structured scientific approach and followed an interdisciplinary approach
4. Through necessity. Due to the scarcity of scientific literature on conservation photography and the impact of images in conservation messaging I explored other disciplines that supported conservation studies

5. The infancy of studies of this nature called for an interdisciplinary gathering of knowledge on the subject.

As there is a deficiency in studies conducted around the effectiveness of imagery in conservation communication, I opted for an exploratory, interdisciplinary approach to get an overview of opinions on the subject in the hope that the findings of the study could lead to a more systematic investigation that can refine targets and objectives. The findings should not be viewed as conclusive but rather as indicative which gives an insight into image interpretation in conservation messaging and should be used as platform for future studies in conservation communication.

1.3 The aim of the study

The aim of this study was to assess the responses of purposefully selected sample groups to a range of 40 pre-selected conservation related images.

1.4 The research questions

The study set out to investigate:

1. If one type of conservation photography was more effective than another in conveying conservation messages
2. How photographers, students, academics, NGOs and nature editors rated the effectiveness of conservation related images
3. If the perception of the impact of imagery in conservation was affected by demographics of the sample group

1.5 Outline of report

Chapter two of this report covers literature reviews on a variety of subjects to elucidate a better understanding of the elements that make up a conservation story. As this study followed an interdisciplinary approach, the literature reviews were not confined to environmental studies alone. Perspectives from the schools of psychology, social science and the arts were included as well. The review includes papers on the importance of biodiversity, communicating science through the arts, conservation photography as a recognised field in conservation biology, the psychological and cultural aspects involved in image interpretation, the media's portrayal of environmental concerns and the use of flagship and charisma status as consumer products. I have deliberately excluded any review on the technical aspects of

photography due to the limitations imposed on the length of this study. Chapter three gives an overview of the methodology used in this study and some of its limitations followed by the results and discussion of the results in chapter four. In chapter five a general discussion follows, elaborating on the findings of the study and offering suggestions for future studies. Finally in chapter six the report concludes by reinforcing the study findings and its implications.

2 CHAPTER TWO – LITERATURE REVIEW

This research followed an interdisciplinary approach and brought together two areas of work covering the domains of conservation and communication. It looked at photography as being the over-arching element for effective conservation communication. The literature reviews starts with an overview of the threats to biodiversity followed by the development of photography as a communication tool in the field of conservation. It further investigates how we interpret images, taking into account cultural and contextual theories. Examples of visualisation studies have been included to support this research.

2.1 Biodiversity losses

Biodiversity losses can lead to species losses and environmental changes on various levels. As conservation campaigns use images to depict environmental changes and to highlight the plight of endangered and threatened species, it is important to understand how effective images are in conveying these concerns.

There is little debate that there is a hastening in the pace of biodiversity losses. This is evident from the increasing number of species that find themselves on the IUCN's Red List of endangered species. The importance of conservation and environmental awareness are the foundations of both the 17 Sustainable Goals set in 2015 and the Aichi Goals in terms of the Convention of Biological Diversity in 2011. Aichi target one states: "By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably" (cbd.org). Similarly, one of the targets of Goal 15 of the 17 Sustainable Development Goals adopted by the United Nations is to " take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020 protect and prevent the extinction of threatened species" (globalgoals.com). The goals and targets adopted by both imply that conservation and environmental awareness can foster a sense of connection in humans to the natural world, by encouraging conservation of natural resources and biodiversity to promote sustainable development.

There is little doubt that climate change and habitat destruction impact on biodiversity (IPCC, 2007). The impacts of habitat losses are widespread and occur across many ranges of biodiversity including species, communities, and ecosystems. Biological responses can be both positive and negative. The result of the negative, emanating from habitat destruction such as clearing of forests, can cause biodiversity declines and losses (Montoya & Raffaelli 2010). Such changes, in worst case scenarios, can result in

extinction of species (Barnosky *et al*. 2011). Further to climate change and habitat destruction, anthropogenic activities such as poaching and human-animal conflicts compound the challenges of conserving biodiversity, creating the urgency to develop conservation strategies that address these issues. Photography forms the forefront of such campaigns.

2.2 Alternative platforms to communicate science

Scientific research is valuable in raising environmental concerns (Arcury 2008) and the responsibility of communicating results to the public falls on the scientists (Leshner 2003). However, the transition from scientific terminology to concepts that the general public may understand is not easily done (Racine *et al*. 2005) and scientific findings are often entrapped in libraries of academic arenas making it difficult to communicate results to the general public (Curtis, Reid & Ballard 2012). Alternatives to the traditional scientific reporting are required to effectively communicate results and findings to the general public.

Learning and behavioral changes occur more effectively when emotions are evoked. Emotions, triggered by environmental events, play an important role in our experiences and behavior and it is linked to cognitive function (Dolan 2002). Nabi (2003) noted that photographs have the capacity to arouse emotions and that this could influence attitudes directly or indirectly by impacting on message processing. It is proposed that good conservation images have the ability to illicit emotional responses. This can be used as a platform to stimulate cognitive function to raise environmental awareness and to effect behavioral change. In an attempt to combat negative attitudes to conservation in Latvia, scientists and artists combined efforts to initiate a new technique to communicate the importance of biodiversity conservation (Opermanis *et al.* 2015).Unlike previous attempts which were mainly scientifically driven, this programme included the arts which included photography, music, dance and poetry to communicate scientific messages. The project ran for 6 years and reported success in pro-environmental behavior, such as using water and electricity more wisely. Results of a survey of the success of the collaboration indicated that 53% of respondents would not have participated if there was only a science component to the programme and 34 % stated that they were not sure. The study reported that 83% of respondents showed an increase in biodiversity issue understanding which was attributed to the inclusion of the arts in science communication (Opermanis *et al.* 2015).

Promoting conservation through arts is likely to reach a more diversified audience more effectively by engaging both emotion and logic of the audience (Jacobson *et al*. 2007). There is a growing allure in the potential of visual representation to sway both belief and action (Scott 1998) as images transcending cultural barriers in ways that words cannot, overcoming ordinary linguistic challenges (Jasanoff 2001). Visual imagery also has the power to define the public's understanding of environmental concerns (Pralle 2006) For example, images of drought are likely to conjure up concern among South Africans, given the current situation of water scarcity in South Africa. Branagan (2005) also suggested that environmental concerns which are not effectively communicated by scientists could be cloaked by the creativity of the arts to communicate environmental messages more effectively. For example, Wild Shots is an initiative that uses photography to teach underprivileged children in South Africa about the beauty of South African animals through conservation education.

2.3 The development of conservation photography

Photography has long been documented as being influential on shaping societal views and natural environment policies (Ward 2008). As far back as 1864, Abraham Lincoln, established Yosemite as the nation's first legislated nature preserve. Carleton Watkin's landscape photography was instrumental in swaying congress to make this decision. This was followed a few years later when Yellowstone was declared the world's first national park due mainly to the work of photographers William Henry Jackson and Dr Ferdinand Vandiveer Hayden (Cahn 1981).Despite these successes it still took more than a century for conservation photography to be recognised as a field on its own. In the twentieth century, one of the pioneers of conservation photography, Ansel Adams, used the beauty of wilderness through his photography to promote the vulnerability of the places he photographed. He used his images to lobby for the establishment of Kings Canyon National Park. His photographs were presented to President Franklin D. Roosevelt and his book of images of the area was later cited for its significance to the campaign (Cahn 1981).

The pioneering trail on conservation photography was not limited to the United States. In Australia, Tasmania, Peter Dombrovskis used his photographs to start a national environmental movement to halt the Franklin Dam project, where hydroelectric dams were intended, saving a vast expanse of pristine wilderness (Ward 2008).In the 1990's Xi Zhinong became the pioneer of the environmental evolution in the Chinese environmental movement. He lobbied for an end to illegal logging in Baimang Nature Reserve, home to the protected snub-nosed monkeys. By using media and other conservation groups, his goals were achieved and helped bolster the growing non-

governmental conservation movement (Xiao 2006). Michael Nichols's worked for National Geographic in 1996 and used this platform to promote advocacy for endangered wildlife and ecosystems (Ward 2008). Among his many achievements in conservation is his inspiring work with Michael Fay. Nichols documented a two year expedition in the Congo across to Gabon with the aim of creating awareness to the threatened species and natural habitats they traversed. Christina Mittermeier is renowned for her work on native Kayapó tribe in the Amazon since 1991. Through her images she has raised awareness and funding for the Kayapó conservation (Ward 2008).Members of International League of Conservation Photography (iLCP) and other active conservationists including Gabby Salazar, Pete Oxford, Daniel Beltrá, Michael North, Daryl Balfour, Brent Stirton, Ami Vitale, Melissa Groo, Jordi Chias, and Peter Chadwick, all who have kindly contributed images that were included in this study, are modern day proponents of conservation, using images to tell their respective conservation stories.

These success stories prove that images can be used effectively to highlight environmental and conservation issue and it is evident that photography has become a vital tool in communicating biodiversity and its conservation. Although there is sufficient literature to showcase the success stories mentioned above, none could be found on the development of the conservation photography movement in Africa. It must be stressed that although photography has been used in conservation awareness since the discovery of photography, very little literature is available on conservation photography itself. The most recent literature on the use of photography in conservation is from Ward (2008) and Farnsworth (2011). Both used qualitative methods in their studies.

Photography in conservation is increasingly acknowledged by both scientists and photographers as an effective tool for biodiversity sustainability and as a powerful communication tool to communicate issues pertaining to social and environmental concerns (Ward 2008). Through such communications, society is connected to Nature and scientific knowledge can be translated to a better public understanding to drive a connection of collected consciousness where people can act as a collective to find solutions to conservation issues and environmental issues (Ward 2008). Here, science is seen as providing the road map with photography as the vehicle that delivers the message. Farnsworth (2011) sees photographers involved in conservation as offering new ways to communicate scientific literacy and providing new paths for community based teachings and studies.

2.4 The media and conservation communication

We are bombarded daily by images in visual media through the tradition print platforms, such as books and magazines and more recently through social media platforms, such as Instagram and Facebook. It is therefore important to understand how images are portrayed in these platforms and if they precondition our interpretation in any way. It is possible that any biasness or any forms of stereotyping displayed in the media towards a particular species or a particular environmental issue can encourage biasness and stereotyping by the reader or viewer as well. A study in the USA looked at what imagery was used in tabloid media to portray animals and found that 9 themes symbolized human–animal relations: "as loved one, saviour, threat, victim, tool, sex object or sexual aggressor, imaginary, person, and object of wonder" (Herzog & Galvin 1992: 1). Context and framing need to be scrutinised more carefully by media consumers to avoid being caught in the trap of stereotyping. It is fair to say that this has a powerful impact on the way we code and interpret what we see both as individuals and as a collective. Houston, Childer & Heckler (1987) suggested that pictorial prompts in media are indicative that images can be used to embed calculated reactions to a message. This has great significance for conservation campaigns. By understanding how targeted audiences are likely to process and react to visual stimuli, editors and conservation communicators can use photography to convey conservation messaging more effectively, evoking a more calculated response to an image.

Visual depictions of animals have the potential to alter a viewer's cultural perceptions of animals (Kalof *et al.* 2011) They question current methods used by media to transmit conservation related messages. They see current images of animals presented in their natural settings as creating a separation between the viewer and subject, making it problematic to buttress support for conservation causes. This separation is similar to what Blewitt (2011) refers to as "nature deficit disorders" when he makes reference to Louw's (2004) attribution to our reliance on media as the only source of environmental information.

How we realise the social world is accomplished by our cultural portrayals of issues (Kalof *et al*.2011). For example, media has played an important role in depicting animals in socially constructed range of cultural representations that circulate in Western culture (Kalof & Amthor 2010). This is problematic and hampers conservation messaging (Kalof *et al.* 2011) where values are based on other cultures. This disenchantment with media can be attributed to a drive by media owners to bolster readership or push a certain agenda. In a personal interview with conservation

photographer, Peter Chadwick, he stated that both nature and conservation photographers have often had their images abused by the media to create sensationalism (P. Chadwick, pers.comm., 6 March 2017). It is concerning to see that even with growing environmental threats such as climate change and habitat destruction that dominate world news headlines, conservation magazines predominately still use flagstone species as their cover stories. There must be an audience appeal that feeds this non- transition to the realities of environmental concerns. Environmental stories rarely make front covers or headlines. In interviews with renowned conservation photographers, Seelig (2015) discovered that the reason for this is that environmental stories are slow to develop, are complex to understand and do not fit into most media's agendas. Unless the environmental story is linked to an event such as an oil spill disaster, it is unlikely to get prominent coverage in the media (Seelig 2015). However not all photographers see this as a fault of all traditional media. National Geographic and The New York Times are credited with successful reporting of many environmental issues by most conservation photographers (Seelig 2015).

The disenchantment with traditional media platforms has led to many photographers exploring emerging social media forums such as Instagram, LinkedIn, Twitter and Facebook to tell their stories. This has massive implications for conservation communication. Facebook alone has almost two billion active users and social media data can provide important information on users and their networks. Social media data can be used to target audiences by providing information on patterns values, consumer patterns and behaviour. This information can be used to the advantage of conservation movements (Di Minin, Tenkanen & Toivonen 2015). Africa is predicted to develop to meet the needs of its growing population. The use of social media is also predicted to grow at a rapid pace in these areas. It is therefore important to understand the needs and drives of these users to ensure that issues on and about conservation can be communicated effectively. Social media data such as values, cultural attributes and attitudes and activities around biodiversity issues are indispensable to recognizing and identifying threats related to biodiversity (Di Minin *et al.* 2015). As social media grows , more research needs to be done by conservationists to understand the requirements of these platforms to engage targeted and new audiences more effectively (Veríssimo *et al*. 2017). As social media is predominately visual, image selection plays a vital role in communicating conservation and environmental issues.

2.5 The use of flagship species in promoting conservation campaigns

Heywood's (1995) definition of flagship species is widely quoted as ''popular, charismatic species that serve as symbols and rallying points to stimulate conservation awareness and action'' (Clucas, McHugh & Caro 2008). Traditionally they are large and easily discernable animals. Flagstone species are used mainly in the following ways in conservation: Firstly, as awareness drivers for conservation. Secondly, as fundraising mascots as emblems by conservation organisations and thirdly as marketing instruments on front covers in magazines to appeal to donors empathy (Caro & O' Doherty 1999). This can result in a certain degree of biasness in favour of flagship species over endangered species that are not see as flagship species. As this has implications for conservation communication it is important to test if audiences do favour flagship species over those that are not.

A study on USA conservation and nature magazine front covers found "that large, meat eating, endangered mammals and large, fish eating or omnivorous birds of little conservation concern dominated the front covers of these magazines" (Clucas *et al*. 2008: 11).The inference from this study shows that flagship species portrayed in magazines and conservation campaigns creates a biasness towards them over less charismatic species (Clucas *et al.* 2008). Another study in the USA looked at factors that play a role in the adoption of zoo animals. Colleony, Clayton & Jalme (2017) found that the animals were not adopted on their endangered species status and people who adopted animals were likely to choose charismatic species over less charismatic ones. A surprising finding was that people who adopted less charismatic animals generally gave more money towards the conservation programme than people who chose charismatic ones (Colleony *et al*. 2017). Two other important findings of this study were that endangered status of a species was not a selection criteria for adoption and positive childhood encounters with nature did influence the way adults viewed nature (Colleony *et al.* 2017).

There is an urgent need to study the potential of conservation marketing on less charismatic species and the impact that media has in delivering these messages. This should assist to decrease the discrepancy in fundraising abilities between the two. As the appeal of the internet and social media increases, so does the captive audiences for conservation on these platforms. It remains unclear in literature whether flagship species are more persuasive in promoting support for a conservation cause over species with no charisma (Home *et al*. 2009). The danger of this approach is that endangered species with no flagship status often are over looked if charismatic species receive all the attention (Entwistle & Stephenson 2000).

A staggering fact is that out of the 54% of wildlife funding in America, only 1.8% of that is used for conservation efforts of all listed endangered species (Metick & Wietzman 1996). They found that the funds spent on a species did not depend on its status of endangerment but rather on the charismatic appeal of the animal. While this refutes Home *et al's* (2009) hypotheses, it does highlight that that charisma may be the nemesis of biodiversity conservation. An alternative provided by Kontoleon & Swanson (2003) is to encourage the public to drop the charismatic approach and to start creating new flagship species devoid of charisma.

In choosing new flagship species in favour of less charismatic species, champions of conservation need to take into account that flagship selection must take local viewpoints into consideration to embrace cultural values and identities in order to be effective. In a study of schoolchildren's perceptions of animals in the UK and Tanzania it was found that the animals favoured by British children were those that are found in the central media stream whereas these charismatic animals were looked upon with disdain by the children in rural Tanzania (Entwistle & Stephenson 2000). African children found more appeal in zebras, giraffes and buffalos than lions, tigers and primates. The basis for their choices were attractiveness and meat quality (Entwistle & Stephenson 2000).While the Tanzanian children feared elephants they did see them as revenue generators and recognised their role in ecotourism. This is evidence to support that it is dangerous to assume that the general public all have the same perceptions of what qualifies as a flagship species. In choosing a symbol for conservation, local involvement is critical to avoid the traps of assumptions about species value and should be selected to resonate with emotional appeal of a participating community (Bowen-Jones & Entwistle 2002) and not solely on Western values.

In a study to determine what factors were instrumental in attracting eco-tourists to sub- Saharan Africa, Hausmaunn *et al*. (2017) used on- line statistics of postings on social media platforms. They concluded that: postings on social media did not favour charismatic species, areas that were more developed with higher population densities in more affluent countries had more media users and that more studies need to be conducted on other factors apart from flagship species to determine the attractiveness of a protected area (Hausmaunn *et al*. 2017).While larger animals are promoted by the media as flagships in these area as important for conservation and protection of these protected areas, the study found that their presence did not impact on posts and likes on social media. This has further implications for conservation communication.

2.6 The psychological and cultural aspects of image interpretation

The discussion around what makes images such powerful tools of communication is vast and complicated. I have chosen to concentrate on the psychology and cultural aspects of image interpretation in the review as these themes emerged in the study, especially in the inter-race comparisons. One plausible explanation as to why images are so powerful is that still images provide the chance of repetition and extended exposure allowing for more extensive retention than text (Myers 2006). For an image to be significantly important to an audience, image producers must realise that the receiver's belief structure is determined by beliefs, values and context which are generally shaped by a person's society. There is sufficient evidence from studies on visual literacy to conclude that messages with photographs are able to capture attention and deliver intended messages more effectively than just text alone because of the minimal effort used in processing them (Solomon 1992). Verbal messaging in the form of text takes more time and effort to process, potentially affecting recall (Solomon 1992). In a study on how images influence news consumers Cope *et al.* (2005) tested the effect of images with captions against images with text narrative. The images were from the Iraq war. The results disclosed that images with captions impacted more on respondent's attitudes than narrative alone and that photographs had a greater effect on respondents than narrative alone. Stories with images also got more attention than those that did not have images.

Solomon (1992) and Myerowitz (1985) argue that viewers are more likely to feel emotionally involved in a news story when an image is part of the story. News stories use images because they stir up emotion. The same can be said of good conservation images. Our primary reaction involves emotion (Myers 2006). When we are exposed to messaging we do a rapid cognitive assessment of the event and reaction then depends on how congruent the message is to our long-term memory and value system (Myers 2006). This emotional content affects readiness to action depending on how aroused we get. The more potent an image is, the greater its ability to affect individuals. This is an important consideration that needs to be heeded by conservation campaigners.

Myers (2006) acknowledges that strategies that use "shock value" rely on a person's ability to be sufficiently aroused to take action. In such cases, graphic visuals images are part of the strategy. While he admits to this being an effective tool in some conservation communication campaigns he warns against the threats to the viewer, including empathic distress. The intensity of this response diminishes as one is able to respond in a helpful way but increases if a sense of helplessness is experienced (Hoffman 2000). Several preconditions need to be fulfilled in order for a response to

occur: the viewer needs to believe that the victim had suffered, that the victim was innocent, that the act was intended to harm and that there is an inflictor who is of sound capacities when performing such atrocities (Myers 2006) If these are met then anger, sympathy and action are likely to be aroused. Controversial images dominate the media. Green (2000) suggests that audiences need to employ methodologies which include intent, content, context, bias and critical appraisal when evaluating these images.

The cultural aspects of image interpretation seems to be lacking in science communication and in the media . A westerner's perspective on elephants as being threatened because of the pursuit of ivory horns may differ from a rural farmer in Africa who sees them as elements of destruction to his land and resources. Cultural orientations may relate to different perspectives in which conservation messages in images are interpreted and should be taken into consideration when designing conservation campaigns. Research has also fallen short in establishing a link between cultural environmental biasness and behaviour, illustrating a gap between knowledge about environmental issues and pro- environmental behaviour (Kollmuss & Agyeman 2002). More epistemological studies need to done to understand the different ways in which people view and engage with the world and should be a focus of science communicators (Medin & Bang 2014). To demonstrate this, Ross, Medin & Cox (2007) did a study on responses to the importance of flora and fauna with rural European American and Menominee hunters. The groups agreed on species importance but the Menominee hunters gave elevated ratings to both plants and animals for importance to self and for importance to the environment. They also saw themselves as being part of Nature and not detached from it as the European American group did.

Conservation science has recently adopted cultural cognition theories to explain why we have different outlooks towards conservation and environmental issues (Kahan 2010, 2012; Kahan *et al*. 2011). The theories recognise that non-consensus over key environmental issues happen because people tend to favour the position that reinforces ties to others whom they value (van der Linden 2016). When someone is subjected to new scientific data, pre-existing cultural biased cognition is reinforced which can result in groups with different values to take opposite views on an environmental issue (Kahan 2012).Cultural cognition theory has only studied American culture (Kahan 2012). Often scientists neglect to take into account the effects of culture in science communication and base their assumptions and conclusions based on western, educated populations. It is not safe to assume that results of these studies can be transferred to other cultural groups. People's perspectives about

environmental concerns are based on their value systems which includes themselves, others in their society and elements of Nature (Schultz 2000). This value-belief-norm (VBN) theory can be used to explain why two people may have the same concern for the environment but may do so for divergent reasons (Schultz 2000).Taking the concepts of this theory into consideration it should be feasible to initiate intervention and environmental education programmes that appeal to feelings empathy and inclusion (Schultz 2000). The findings of this study bares testament to this statement and this finding has implications for conservation communication.

Efforts to conserve biodiversity in Africa become more challenging as human–wildlife conflicts increase. In order to look at effective solutions to conflict alleviation, support of the local population is vital. However, as Africa's population grows and pressure for agricultural lands increases it is less likely that areas can be protected for the sake of conserving biodiversity. Tina Boshe, an instructor at Africa Wildlife Management College in Mweka, stated: "Africa's problems like its animals is uniquely African and any solutions must be African. Europeans speak of posterity. To an African what good is posterity? What is the future when you have nothing but an empty stomach?" (Abrahamson 1983:1). Solomon ole Saibull, conservator of Ngorongoro Conservation Area solidifies this argument when he said that East Africa is likely to go to war over land that could be used for food security. He saw this as the greatest threat to wildlife conservation (Abrahamson 1983).

In a similar vein a study from Browne-Nuñez & Jonker (2008) tried to see if Western based theory could be applied to African settings concluded that cultural variation must be taken into account when apply theoretical frameworks to wildlife conservation. They reviewed work by several African social scientists in terms of reliability and viability of studies on attitudes and found that the definition of attitudes was not consistent with Western concepts. One of the social scientists, Mordi, used the concept Maslow's Hierachy of Needs to base his hypothesis on conservation attitudes in Botswana (Browne-Nuñez & Jonker 2008). Basic human needs must be given attention when conservation needs in Africa are addressed.

Another paper looked at attitudes of a rural community towards conservation efforts in Umfolozi/Hluhluwe/Corridor Complex Game Reserve in South Africa. Infield (1988) interviewed occupants of 182 households in the area, some who had derived benefit from the conservation area. He found that while 65% showed positive attitudes towards conservation, less showed the same for the area being conserved or for the

people that managed it. Households that benefitted from the conservation area displayed positive attitudes to the conservation efforts. Education and affluence played a role in the way respondent's viewed conservation. A general increase in positive attitudes was seen with increased levels of education and wealth (Infield 1988). This indicates that while impoverished people may support the concepts of conservation in general, they may not feel that they have the liberty to act given their circumstances.

Community based conservation (CBC) theories have been proposed for many African areas where biodiversity is threatened and advocates that rural people be an instrumental part of conservation programmes (Main 1995). What the theory fails to acknowledge is that poverty is part of life for most rural Africans and CBC can only be successful if Maslow's Hierachy of Needs are addressed.As the demand for land increase, it is likely that human conflicts will also increase which would further hamper biodiversity conservation efforts (Scoones 1995). Main (1995) notes that urbanization of Africa is increasing but even with the increase Africans tend to maintain family ties in rural areas (Hackel 1999).

Another consideration for conservationists is that wildlife in Africa remains a valuable resource for most Africans and is used consumptively. This forms a strong connection between Africans and wildlife (Sifuna 2012). As traditional uses are governed mainly by Westerners with their perceptions of what regulation policies should be, it is inevitable that these policies are likely to be opposed as it infringes on the African way of doing things (Sifuna 2012). In order to foster positive attitudes he proposes that African governments should advocate for the traditional uses of wildlife. On the achievement of this, Africans are more likely to view wildlife as valuable and worth protecting. It is important to realise that African views of wildlife and the environment are perceived from consumptive viewpoints while Western societies view the importance of environment more from the intrinsic values it provides (Sifuna 2012).

2.7 Visualisation studies

As a study of this nature has not been conducted before, very little literature was available to support the findings of this study. The closest literature found was a questionnaire used by Sun (2006) on Kyoto University students to determine how accurately they would interpret messaging of two environmental posters that depicted global environmental issues. The study found that the respondents who had prior knowledge of the events were able to interpret the messages correctly. Although the

original intended messages were lost to those who had no prior knowledge, they were still aroused through the metaphorical imagery used in the posters (Sun 2006). There are strong parallels to the findings of this study.

Landscape and climate change visualisation have been tested to see if visualisation could influence perceptions and behaviour (Sheppard 2005). Sheppard (2005) tested if visualisation of climate change futures scenarios could be used to elicit emotions and enhance awareness of climate change issues. He found that such scenarios have the ability to evoke emotional responses by highlighting climate change threats but people are less likely to be influenced to take action because the effects of climate change are not immediate and it is difficult to visualise the effects if the threats are not perceived as a direct risk to an individual. A similar sentiment is echoed by Nicholson-Cole (2005) who felt that the scale of climate change effects also posed a problem to climate change communication. Participants' knowledge about climate change in this study was predominately media based and they found it difficult to envisage future climate change scenarios on their own (Nicholson-Cole 2005). Similar trends were found in this study on the environmental related images.

A visualisation study by Kalof *et al* (2011) set out to see if the cultural meaning of animal portraiture had an impact on conservation attitudes. Using 29 photographic images exhibited at a museum in France, the authors of that study documented pre and post viewing reactions of 50 visitors in a Personal Meaning Map. 88% of the study sample were French, with over 50% being between ages 20 to 29 and 12 % were members of conservation groups. The images were the work of artist Zammit- Lucia who is a co-author of the paper. He uses studio portraiture techniques to frame the animals in a way that is associated with human representation. Kalof *et al* (2011) further hypothesised that by using these techniques and eye contact a sense of kinship can be enhanced while maintaining respect for the subject.

They found that pre-exhibit, the sample group generally considered animals in terms of "Nature" and "Wild and Free" creatures and post – exhibit the meaning of "Animal" changed to words depicting "Personalities" and "Kinship" to humans. The largest change was seen in a dramatic increase of the sample group attributing "Personalities" to the animals. 86% of the group were recorded to have changes in their perceptions post-exhibit (Kalof *et al.* 2011). A similar study was conducted by the authors on 51 students at a college in Quebec by showing a slideshow, presumably of the same images. A staggering 92% altered their perceptions of 'Animal' after exposure to the

images. Post- show perceptions again moved to “Kinship” and “Individuality.” Based on these findings the authors conclude that this depiction of animals can have implications for conservation communication. They further state that traditional nature and wildlife images and film documentaries create a distance between the viewer and the animal putting feelings of vulnerability and kinship at risk. Surprisingly these conclusions have not been challenged. There is consensus that visual portrayals of animals have the capability to revise human perceptions and cognition toward animals but there are several limitations and shortcomings in these studies which will be discussed in Chapter 5.

From the literature cited in this review it is difficult to refute the persuasive power of images and that how images are framed in the media does undoubtedly affect our interpretation of them. If images are to be used effectively for conservation messages it should be noted that images do not work in isolation. Context needs to be attached to these images and needs to consider aspects of values, social norms, cultural identities and preferences. “The image is the “hook” that grabs the viewer’s attention. The caption puts an image into perspective and leads to the broader story that in turn ignites interest into the science behind the issue and if done effectively enough will lead to a “call to action””(P. Chadwick, pers.comm., 6 March 2017).

3 CHAPTER THREE – METHODOLOGY

This research followed an interdisciplinary path and used qualitative methods to evaluate the impact of photographic images in conveying conservation related messages.

3.1 Study design

This research followed an exploratory, qualitative design through the use of a three point Likert rating scale, with closed- ended questions, in structured interviews to rate the impact of 40 photographic images in conveying conservation related messages **(Appendix A).** Likert scales are used widely as scientifically accepted measurement of attitudes and opinions and generally consist of a 3, 5 or 7 point measurement scales. Jacoby & Matell (1971) found that the number of measures on a Likert scales had no bearing on reliability or validity and concluded that 3 point measures were good enough to test responses. For the purposes of this study a 3 point scale was considered so as not to over complicate responses. On each image respondents were asked to rate the conservation content as having strong (S), weak (W) or no (N) conservation messaging.

Qualitative design approaches are open to risks of sampling biasness and reliability of responses. As this study relied on subjective image interpretation, it is acknowledged that it was not possible to eradicate biasness totally. To minimise sampling biasness, image contributors were requested to supply images to cover a broad range of categories (Table 3.1). Although the sample group was purposively selected, sample size and diversity among key informants further ensured that sampling biasness was overcome to a certain degree.

The appropriate sample size for qualitative research is not clearly defined in literature. Suggested guidelines for qualitative studies include:

1. Morse (1994) suggests 30-50 participants for ethnography studies
2. Creswell (1998) suggests 20 -30 participants for ethnography studies
3. Cresswell (1998) suggests 5 – 20 participants for phenomenological studies
4. Morse(1994) suggests at least 6 participants for phenomenological studies

For the purpose of this study, 15 was the number set by the proposal panel as a suitable sample size in each of the sample groups. A suitable sample size for qualitative

research is one that answers the research questions (Marshall 1996). The nature of the study and the results dictate what sample size is appropriate and becomes evident as the study progresses (Marshall 1996). Data saturation needs to be taken into account in exploratory qualitative research. Fusch & Ness (2105) believe that if the research reaches a point of no new data and themes then data saturation has been reach. In such cases data sizes do not have a bearing on the outcome of the study but what constitutes the data does. Data saturation was evident in this study.

3.2 Selection of images

My proposal panel suggested I include a wide range of images to overcome a degree of biasness in image selection. Four broad categories were chosen to represent the range of images used in conservation campaigns (Table 3.1).Acclaimed photographers, South African nature magazine editors and non- government organisations (NGO) involved in conservation projects were approached for photographic images which they considered to have been successful in their conservation campaigns in a particular category. Conservation related images were also sourced from the internet. 65 images were received from these sources. I pre-selected 40 images to ensure that all categories had representation in the questionnaire (Table 3.1). Although images are open to interpretation, all images selected could be assigned to these broad categories. Some images fell into more than one category. It should be emphasised that the placing of the images into the listed categories is based on my opinion and that of the image contributor alone and applies only to the confines of the study.

Table 3.1 Image categories

CATEGORY	IMAGES (Appendix A)
Nature related conservation images depicting the aesthetics of species	1,4,10,13,15,16,17,21,25,27,33,40
Nature related conservation images depicting the plight of endangered and threatened species	1,6,8,12,13,14,16,18,21,22,26,29,31,35,36,37,38
Images of people and the environment	3,11,13,19,23,26,29,30,39
Images depicting environmental concern	2,5,7,9,19,20,23,24,28,34,39

3.3 Design of questionnaire

The 40 pre-selected images were compiled into a survey with a 3 point Likert scale offering weak, strong and no messaging as responses. Images were presented without any accompanying text or context. The order of the images in the questionnaire was deliberate, offering the mixture of images to be accommodated equally and relatively

evenly. In the case of the wild dog and elephant images, images of adults were placed before images of the respective young. To safeguard against image piracy, low resolution images were used and all images were marked as “WITS research project.”

A participant information sheet highlighting the important aspects of the study was attached to each questionnaire with an invitation to participate in the study. Invitees were informed that responses and demographics would be used in the report writing and were advised that the questionnaire offered the option of anonymity should they wished not to be named. Key informants were also informed that they could decline to answer anything on the questionnaire that they were not comfortable with or were unsure of. The first page of the questionnaire gave respondents instructions on how to answer the questionnaire followed by a basic, personal information section. This section also allowed for participants to remain anonymous if they desired. All respondents were advised that all images used in the questionnaire remained the copyright of the photographer and could not be used without permission. The questionnaire also offered respondents the optional choice of elaborating on their choice of responses. At the end of the questionnaire respondents were also asked to choose five images that they considered to have the strongest and weakest conservation messaging. Although this was optional, it was later excluded as many respondents complained that this inclusion made the questionnaire too long. Respondents were instructed either verbally or via email to leave this section out in their responses.

Two pilot studies were conducted. The first study was done on six engineers at my workplace to determine if the questionnaire was easily understood and to estimate the time it would take to complete. Without the elaboration of choices, responses to the 40 images on the Likert scale took the engineers an average of 10 minutes to complete. As many of the Black respondents in the study were students, the second pilot study was conducted at my workplace on a further 6 Black employees and 4 White employees at various levels in the organisation to get an indication if the results from race comparisons were a function of race or a function of respondents being students. Black and White respondents from my place of work responded similarly to the participants in the study in the race comparison, indicating that it is possible that the results were a function of race.

3.4 Key respondents' information

103 key informants participated in this study. This research used both convenience and purposeful sampling in selecting the sample groups. Respondents self-identified themselves into listed categories which were available on the first page of the questionnaire. Some respondents had dual descriptions and were counted separately in each category.

The sample group consisted of:

45 Nature photographers of which 29 were involved in conservation efforts and 16 were not, 14 academics which included 7 academics in the field of conservation from the University of Witwatersrand and 7 academics in the field of conservation from other universities , 6 individuals involved in conservation communication such as editors and conservation spokespersons, 6 NGOs involved in conservation work and 43 postgraduate students of which 24 students were from the Faculty of Science at the University of Witwatersrand, 16 students were from the Faculty of Engineering at the University of Witwatersrand and 3 students were from other educational institutes in South Africa.

The distribution of participants was widespread and global and included 67 from Africa and 25 from other countries which included Canada, India, Italy, New Zealand, Netherlands, Sweden, UK and USA. 11 respondents did not state which country they represented. The sample group consisted of 24 Black respondents, 56 White respondents, 1 Coloured respondent and 8 Indian respondents. 14 respondents did not mention their race.36 females and 48 males participated in this study. 19 respondents did not state their gender. The sample had a wide age range, from 18 -72 years.

3.5 Distribution of questionnaire

The questionnaire was distributed to the sample group electronically via email. 24 WITS students received hardcopies and responded immediately. Responses were received electronically or as hard copies.

3.6 Data compilation and analyses

Responses from 103 returned questionnaires were recorded on Excel capturing basic personal information provided by respondents and the strong, weak or no messaging responses per image. Pivot tables were create from the captured data and responses

for each sample group were converted into percentages. Responses were evaluated manually using pivot tables and were ranked and analysed in terms of the percentage agree method. Sample group responses were then compared graphically. As the study had 4120 basic comparisons and a further 15 400 group comparisons, only similarities and differences of ≥ 20% were considered in the results reporting. Participants had the option to elaborate on their responses. General inductive content analysis was used to analyse the responses received. Comments were summarised and presented in the appendix section of this report **(Appendix C).**

3.7 Statistical analyses design

Pearson Chi^2 tests for independence were used to determine p values to evaluate how likely the differences in image interpretation between comparison sets arose by chance by testing the null hypothesis that the variables compared were independent. By convention, p values of less than and equal to 0.05 are regarded as significant. Anything below that was considered as a very low probability. Pearson Chi^2 tests were run on the raw data from the excel sheet used to capture responses. Blank responses were excluded. Variables were generated for:

1. Race: The majority of the participants in the study were either Black or White and hence a dichotomous variable was generated for Black and White participants in the study. All cross tabulations using race were done with these 2 major race classifications.
2. Age: Age was categorized into 3 categories: 18-30 years; 31-40 years; >40 years
3. Sex : Participants identified themselves as male or female. A dichotomous variable was created to assess the differences between these groups.

In groups where the cell sizes were less than 5, the Fisher's exact test was used to assess differences between groups. In this study the demographic comparisons by race, sex and age on reaction to the conservation images were of interest. The chi-square test for independence was used to determine whether there was a statistically significant difference between the expected and observed frequencies of the responses of the study participants. A p-value of <0.05 was considered statistically significant and hence I rejected the null hypothesis that there was no difference in perceptions between the groups. Sample size differences did not have any bearing on the statistical test as it compared response rates and did not numbers. So the null hypothesis was that the proportions of each population will respond in a similar way. A $p<0.05$ means the group are significantly different in their responses. This is confirmed by Norman (2010), "statistics can be used with Likert data, with small sample sizes,

with unequal variances, and with non-normal distributions, with no fear of ‘‘coming to the wrong conclusion’’”. All analyses were done using STATA version 12.

3.8 Assumptions made in the race comparison analyses

Certain assumptions were made in the interpretation of the race comparison results:

1. That Black participants may still have rural roots
2. That White participants may be more affluent than Black participants
3. That White respondents may have more access and larger choices of media platforms than Black respondents

3.9 Limitations of study design

The study design had limitations.

1. The option of anonymity was only offered in the research report and may have excluded individuals who may have wanted to participate but wanted to remain fully anonymous
2. There were too many images which overcomplicated analyses of responses and may have also deterred some invitees from participating
3. There were too many image categories which made it difficult to draw conclusions in each category
4. There were too many comparison groups. If limited to fewer groups with more participants the results could have been more significant
5. Apart from the basic demographics of race, gender and age, no information about the background of key informants was asked for. Affluence indicators as well as urbanisation information would have added significantly to understanding the findings
6. Academics, NGOs and conservation communicators sample groups did not meet the minimum criteria of 15
7. As the interpretation of images is subjective it is acknowledged that the study could not be totally free of biasness

3.10 Issues of reliability, biasness, ethics

The reliability of the study design was tested indirectly through two pilot studies, both of which returned results similar to the study. To overcome biasness, a diverse

selection of images was used to cover a wide range of categories (Table 3.1). Participant selection was also diverse and provided a wide range of perspectives. Study participants were drawn from internationally and locally renowned leaders in their field of expertise and students and academics were chosen from reputable learning institutes. A certain degree of biasness was expected from responses to the recognisable images of professional conservation photographers by other photographers but that was countered by the responses from the rest of the sample group. Ethics approval was received before the commencement of the study. This study has Ethics Approval H17/02/27 **(Appendix D).**

4 CHAPTER FOUR – RESULTS AND RESULTS DISCUSSION

For ease of interpretation, results of this study have been presented for each study question followed by a discussion on the results and any emerging trends. It needs to be emphasised that the technical aspects of photography that govern image choices were not considered in this study but may also have played a role in image selection.

The responses of each self- identified sample group were tested for the most strong (S), weak(W) and no (N) messaging images and then further expanded to compare responses of images within each groups that showed differences in interpretation by 20% or more. Photographers and editors responses were also compared to the rest of the sample group. Although not part of the study questions, I expanded the responses of photographers and editors and compared them to the responses from the rest of the sample group because I believe that they are instrumental in conveying conservation messages both through capturing images and by deciding what is published and communicated. Statistically significant results as determined by Pearson's Chi^2 tests are presented as p –values in selected sample groups. Sample groups of less than 15 participants, such as NGOs and academics, were not analysed in detail. In addition to the research questions, the study questionnaire offered an option to key informants to elaborate on their choices. A summary of these responses is presented in (**Appendix C)**.

4.1 Question 1

Question one investigated if one type of conservation photography was more effective than another in conveying conservation messages

Results indicate that one particular type of imagery does indeed contain stronger conservation messaging and these seem to be the more graphic images in the questionnaire. Images that rated the strongest in terms of conservation messaging included the images of the dehorning, the gorilla being carried by humans, the netted turtle, the poached rhino, the sharks on the beach and the elephant being de-tusked (Figure 4.1).

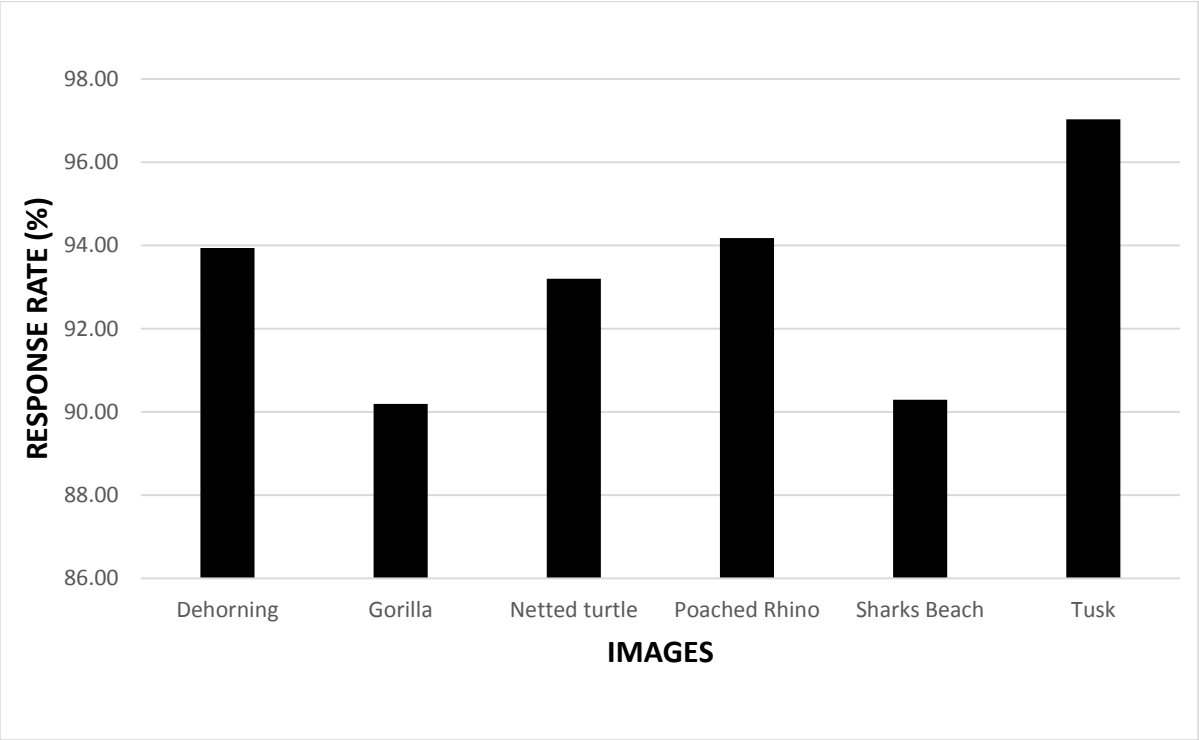

Figure 4.1 Images that conveyed the strongest conservation messaging as rated by all participants

All of these images could be regarded as having graphic content that have a “shock or horror” value and are generally shunned by conservation communicators and editors alike. These findings are also in contradiction with literature review and may be an indication that literature reviews may need updating. Images choices indicated that choices were based on endangered status as all animals depicted in these images are endangered. This is another finding which contradicts studies in the literature review section. It is interesting to note that the netted turtle is the only choice that represented environmental concern. There was consensus among key respondents in terms of these image choices yet these images rarely make the covers of nature and conservation related magazines. In order to reduce media fatigue it is proposed that a balance of the aesthetic photos and the shocking photos is perhaps what is needed to effectively drive home conservation messaging.

Choices of the images that had the most weak responses included the rhinos, wild dog pup and tiger running images indicating that endangered species was not a factor used in selection(Figure 4.2) .

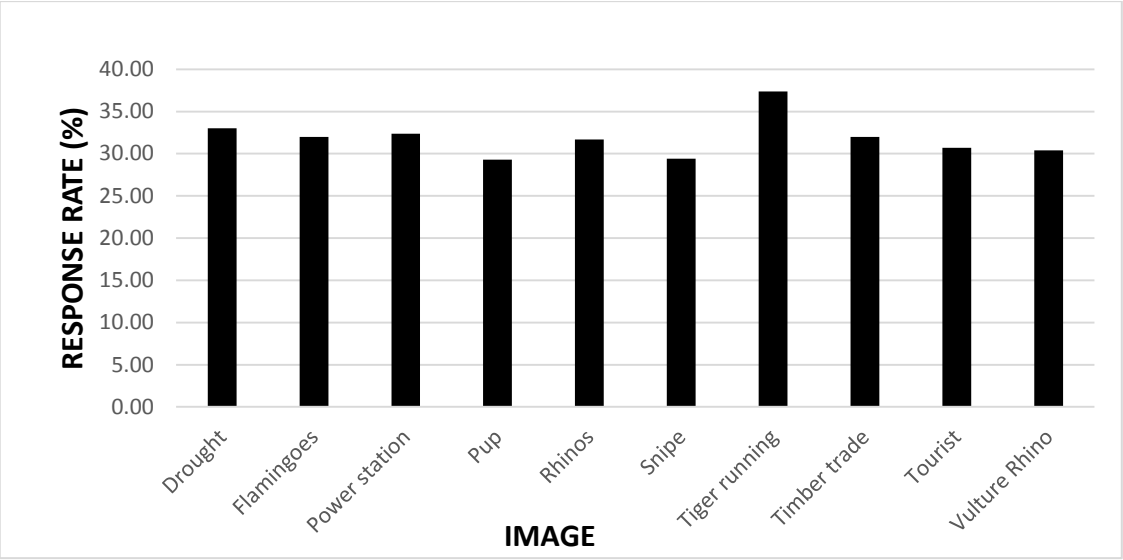

Figure 4.2 Images with the most weak responses as rated by all participants

Images that were considered to have no conservation messaging included the African wild dog images of both adults and a pup, as was the portrait of a tiger's face (Figure 4.3). These results indicate that neither endangered nor flagship status and charisma were a consideration in choices.

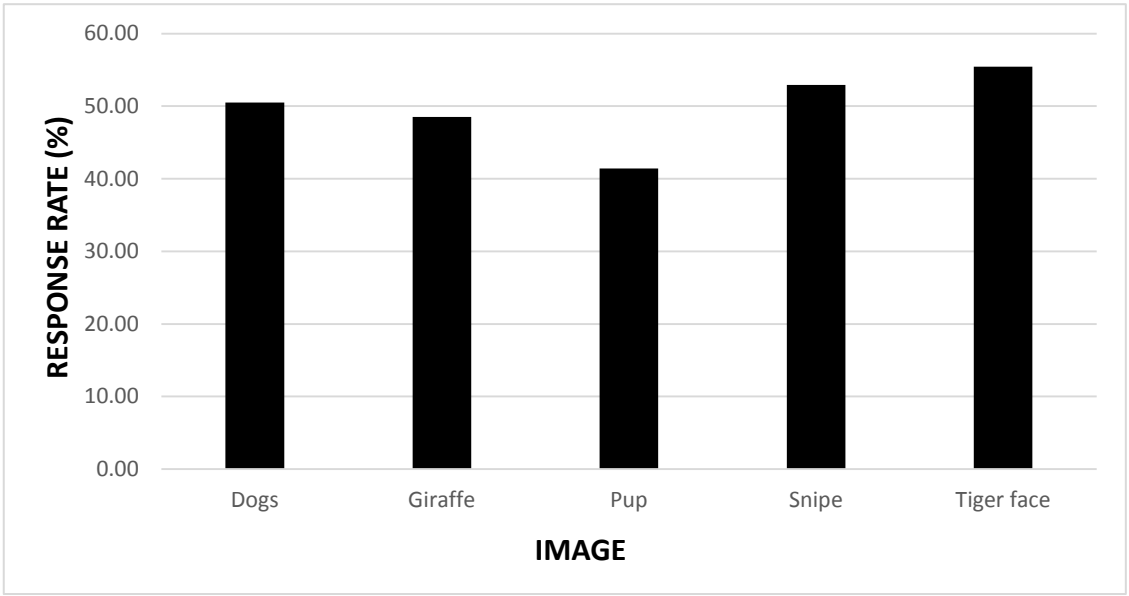

Figure 4.3 Images with the most no messaging responses as rated by all participants

4.2 Question 2

Photographer comparisons

A total of 45 self-identified nature photographers participated in this study. 29 of the photographers were involved in conservation projects (CP), either as photographers or as contributors to a conservation project. 16 photographers were not in involved in conservation efforts or supported conservation organisations (P).Photographers in general showed no differences in their choice of their strongest images (Table 4.1) and those they felt conveyed no conservation messaging (Table 4.2).

Table 4.1 Images that photographers rated as having the strongest conservation messaging

STRONGEST IMAGES		
Image	**CP (%)**	**P (%)**
Dehorning	93.10	100,00
Gorilla	96.43	93.75
Netted Turtle	100,00	100,00
Poached Rhino	100,00	87.50
Tusk	96.55	100,00
Sharks on beach	96.55	81.25

Where (CP) = photographers involved in conservation and (P) = photographers not involved in conservation. n (CP) = 29 and n (P) = 16

Table 4.2 Images that photographers rated as having no conservation messaging

NO MESSAGING IMAGES		
Image	**CP (%)**	**P (%)**
Dogs	65.52	43.75
Elephants	62.07	62.50
Flamingo	48.28	56.25
Giraffes	58.62	68.75
Pup	55.56	50.00
Snipe	50.00	75.00
Tiger face	68.97	56.25

Where (CP) = photographers involved in conservation and (P) = photographers not involved in conservation. n (CP) = 29 and n (P) = 16

The images that conveyed the strongest conservation messaging were the images that contained the most graphic content. Reasons given for these choices were that these

images evoked strong reactions and that the respondents felt that they wanted to intervene (**Appendix C**). The choice of images suggest that endangered status of images did play a role in their selection of images that conveyed strong conservation content but not in the selection of images that conveyed no conservation messaging.

Images that were considered by photographers as having no conservation messaging included charismatic images such as the tiger face and the wild dog pup. This finding is contrary to what the media generally uses in conservation communications. This will be explored further in the discussion section of this report in Chapter 5. Neither charisma nor endangered status played a role in choice of images with no conservation messaging. Less than 5 % of respondents did comment on the endangered status of the adult wild dogs, the wild dog pup and elephants but felt that although the images had aesthetic appeal they did not have any conservation messaging. Less than 2% of the sample felt that images with aesthetic appeal could be used to lure donors to conservation causes.

For the balance of the images, a graphical representation shows image responses that differed by 20% and more (Figure 4.4). Apart from the deforestation image, (CP) responses were lower than (P) responses. A possible explanation is that photographers involved in conservation are perhaps more critical in evaluating content of images than photographers not involved in conservation. There were no noticeable trends on the weak responses (Figure 4.5). A possible reason is that these images were more open to interpretation and that individual values systems play a role in how these images are perceived.

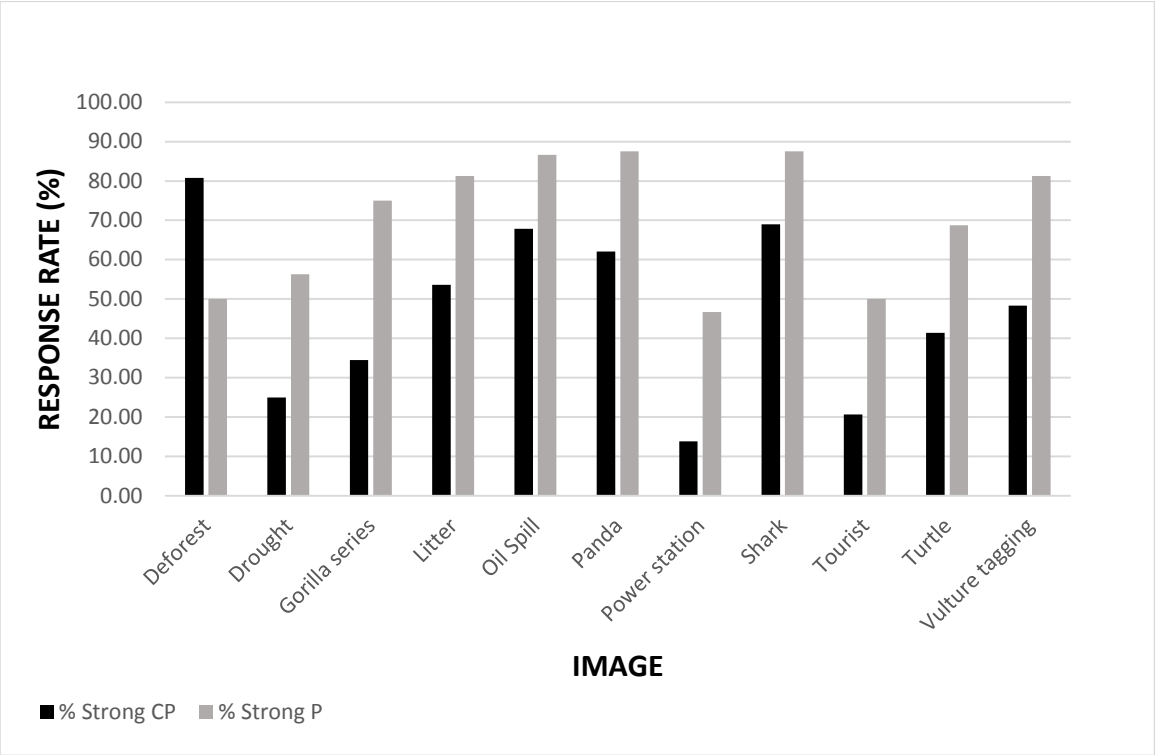

Figure 4.4 Strong response comparisons differing by 20 % and more between photographers in conservation (CP) and photographers not in conservation (P)

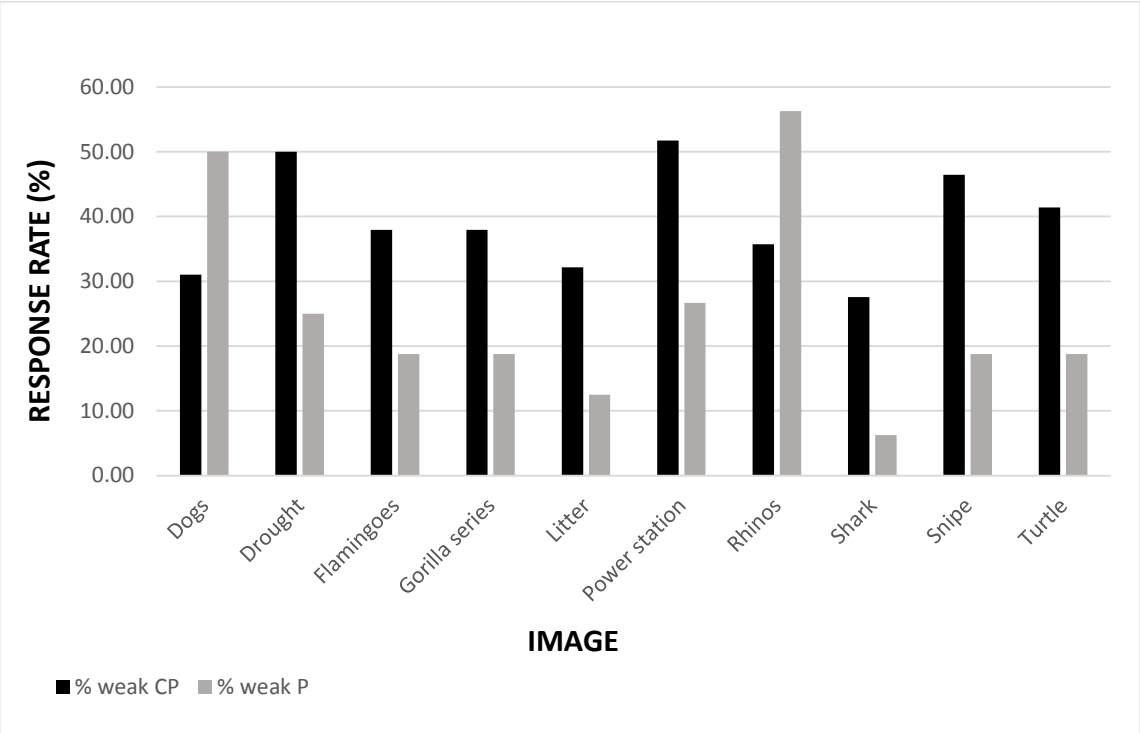

Figure 4.5 Weak response comparisons differing by 20 % and more between photographers in conservation (CP) and photographers not in conservation (P)

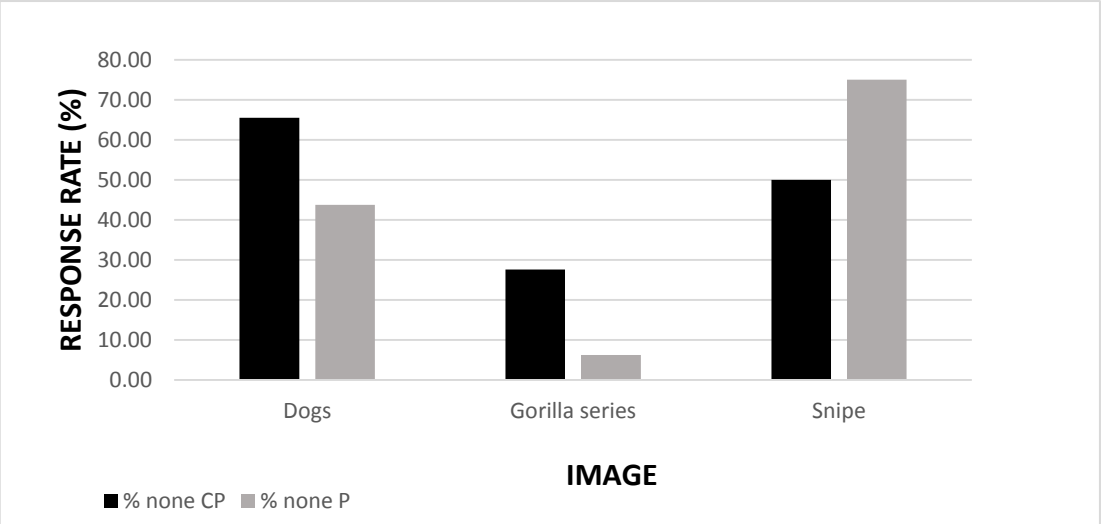

Figure 4.6 No messaging response comparisons differing by 20% and more between photographers in conservation (CP) and photographers not in conservation (P)

The wild dog image, the gorilla series image and the image of the snipe were the only no messaging images where there was a difference of more than 20 % between the response rate of (CP) and (P) (Figure 4.6).

Pearson Chi^2 tests were run on all the photographers' responses to determine p values. The power station image and the gorilla series images were regarded as statistically significant, confirming that photographers responded to all of the images similarly, except these two images. It should be noted that both these images are reflected in Figure 4.5 in the weak image responses that differed by 20% or more. The p values can be interpreted as a 0.05 % and a 0.04 % probability respectively that the differences in interpretation of power station image and the gorilla series images did not occur by chance (Table 4.3).

Table 4.3 Statistically significant images in photographer comparisons

	Power Station Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
Photographers in conservation (CP)	15.00	50.00	35.00	5.7428	0.057
Photographers not in conservation (P)	53.85	23.08	23.08		
	Gorilla Series Images				
	S	**W**	**N**	**Pearson Chi^2**	**p**
Photographers in conservation(CP)	35.00	35.00	30.00	6.3779	0.041
Photographers not in conservation (P)	78.57	14.29	7.14		

All nature photographers (P) versus rest of sample group

As nature photographers are contributors to the images that are used in conservation campaigns, I thought it pertinent to compare all self- identified nature photographers (P) responses to the responses of rest of the sample group.

In comparing strong, weak and no messaging images that differed by 20% or more between all photographers (P) and the rest of the sample group, photographers in general did rate images differently than the rest of the participants of the study (Figure 4.7- 4.9). The general finding was that photographers responded less strongly to images that were rated as strong and more strongly to images that were rated as weak, with the exception of the pelican image. A possible explanation for this result is that photographers may evaluate images more stringently in terms of the general rules of photography, more so than the rest of the sample group. The pelican image is a well- known image which has been in various media platforms which could possibly have resulted in biasness through recognition.

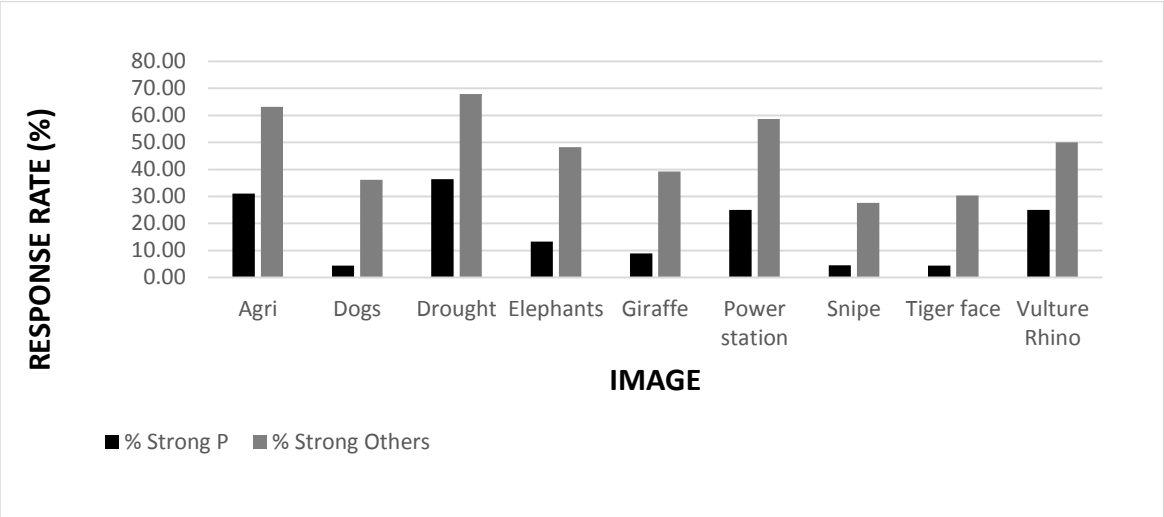

Figure 4.7 Photographers (P) versus rest of sample group (Others). Comparison of strong responses differing by 20% or more

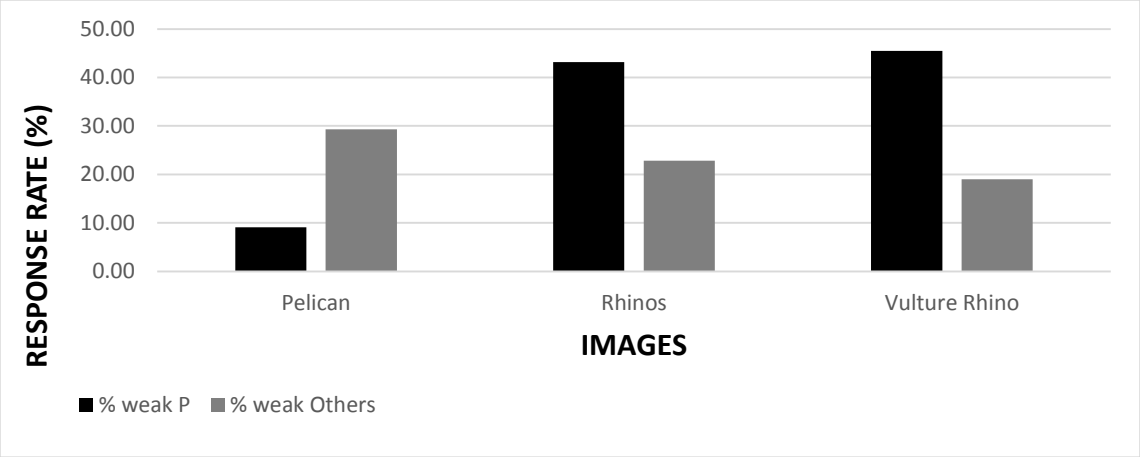

Figure 4.8 Photographers (P) versus rest of sample group (Others). Comparison of weak responses differing by 20% or more

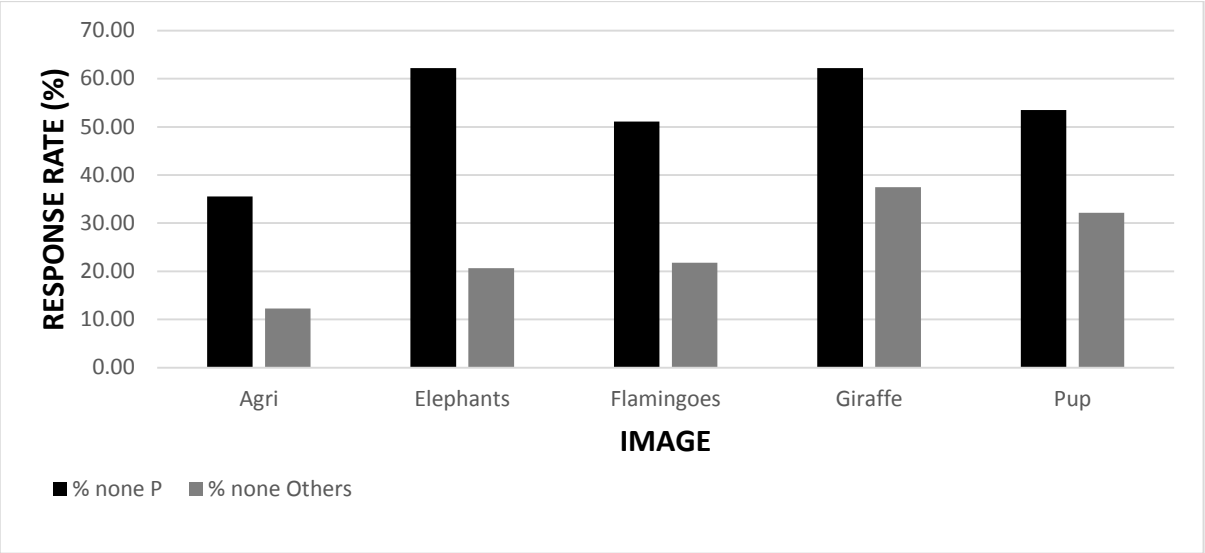

Figure 4.9 Photographers (P) versus rest of sample group (Others). Comparison of no messaging responses differing by 20% or more

Question 2

Student comparisons

A total of 43 self- identified postgraduate students participated in this study. 24 postgraduate students were from the School of Animal, Plant and Environmental Sciences (APES) at WITS, 16 students from the Faculty of Engineering at WITS and 3 students from other educational institutes in South Africa.

Results indicate that there were very little differences in the interpretation of strong responses by all students and no significant trends in the interpretation of weak responses. A similar conclusion was made about response rates on images that were interpreted as not having conservation messages. This is surprising as one expects that environmental science students from APES should have a deeper understanding of conservation issues than students from other disciplines. These results indicate that all student respondents had a similar understanding of environmental issues.

Pearson Chi^2 tests were run on all images to determine p values and the timber trade images, the flamingos and the horn measure images were regarded as statistically significant (Table 4.4). This confirms that students responded to all of the images similarly, except for the images listed in the table. In these images students agreed on strong responses but differed considerably in their weak and no responses to these images. On the Timber Industry images for example, 60.87 % of APES students rated

the image as strong(S) as did 71.43% of other students. 30.43% of APES students saw this as a weak (W) image but none of the other students concurred. Similarly 28.57% of other students thought the image had no (N) conservation messaging as compared to 8.7% APES student. There was no obvious explanation for this trend.

Table 4.4 Statically significant images among student comparisons

	Timber Trade Images				
	S	**W**	**N**	**Pearson Chi^2**	**p**
WITS (APES)	60.87	30.43	8.70	6.5305	0.038
Others	71.43	0.00	28.57		
	Flamingos Images				
	S	**W**	**N**	**Pearson Chi^2**	**p**
WITS (APES)	47.83	43.48	8.70	7.3699	0.025
Others	57.14	7.14	35.71		
	Horn Measure Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
WITS (APES)	58.33	37.50	4.17	8.3035	0.016
Others	78.57	0.00	21.43		

Question 2

Academic comparisons

Responses of 14 academics involved in conservation were compared. These comprised of 7 academics from APES at WITS and 7 academics from other universities. There were no major findings in terms of the choices made for strong, weak and no messaging images by academics, indicating that academics may have similar understanding of environmental issues. In a comparison of academic responses against the rest of the sample group, no obviously trends were noticeable. It is acknowledged that the small sample size of the academic participants may have played a role in the outcome of the results and further studies need to be conducted to gain a better understanding of responses. No statistical tests were conducted on this group.

Question 2

NGO comparisons

Only 6 NGOs involved in conservation were approached to participate in the study. Respondents held senior management positions at the NGOs represented. The number was too small to draw any conclusions or inferences but one theme is worthy of note. 100% of the respondents rated the oiled penguin, the netted turtle and sharks on the beach as images having strong conservation content (Figure 4.10). These images are all ocean related.

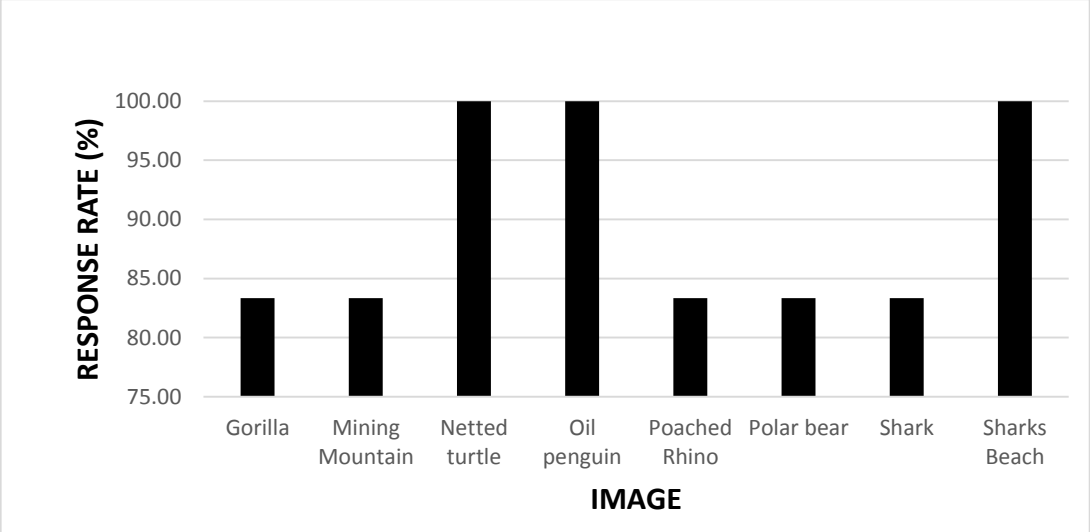

Figure 4.10 NGOs strong responses

Question 2

Editor comparisons

Only 6 editors participated in the study. Although the number of participants is too small to draw any conclusions or inferences from, a few themes emerged that are worthy of note. Firstly, their choices of the images with the strongest conservation messaging were unanimous (Figure 4.11). Out of the five chosen, none had charismatic status. Secondly, with the exception of the elephant being de-tusked, the rest of the images related to environmental issues. Thirdly, their choices contradict the findings of charisma and media studies in the literature review.

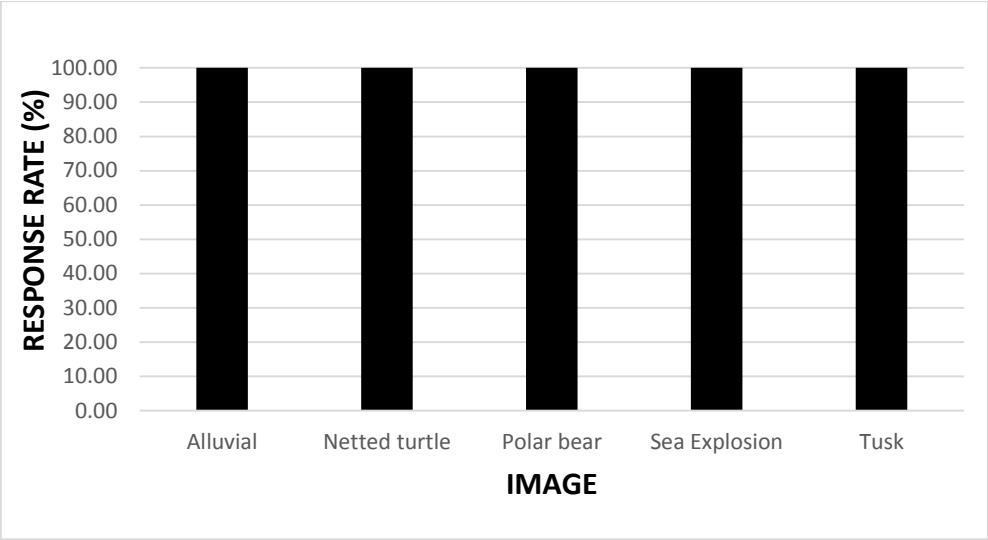

Figure 4.11 Editor's strong messaging responses

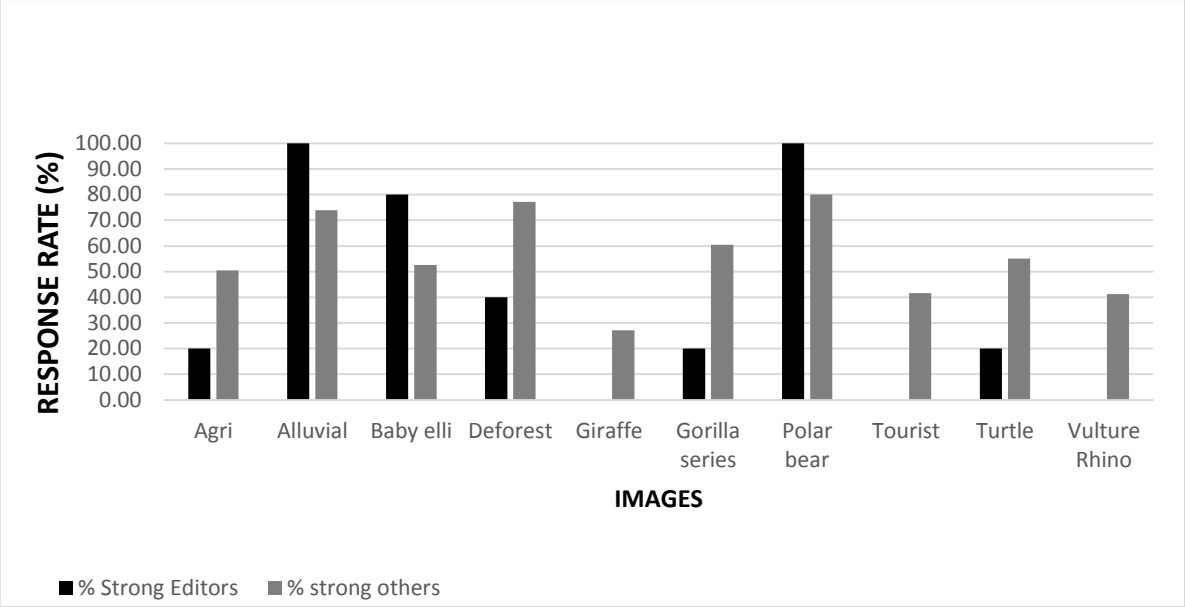

Figure 4.12 Strong responses editor versus rest of sample group differing by 20% or more

When compared to the rest of the sample group, editors differed in the interpretation of some of the images in the study (Figure 4.12). Although the sample size of editors was too small to make conclusive deductions, results indicate that this is an area of study that needs to be expanded to test if editor's views do indeed differ from their audience.

4.3 Question 3

Demographic comparisons

In testing if demographics played a role in image interpretation, this study compared race, gender and age responses. The most noteworthy finding was in the race category where respondents' responses differed significantly in 50% of the images that were rated. It could be argued that because most of participants were self-identified as students, the results could be a function of participants being students and not as a result of race. When results of the race analyses were determined, a pilot study was conducted on 6 Black and 4 White employees at my workplace at various levels in the organisation. Results mimicked results of the study for race analyses, suggesting that results were a function of race for this study.

Pearson Chi^2 tests were run on all images responses to determine p values in each category. (Figure 4.13- 4.15) were consolidated with Pearson Chi^2 tests to calculate p values. The most significant statistical finding was the differences in image interpretation between Black respondents and White respondents. It was found that Black respondents and White respondents differed significantly in their responses on 50 % of the images in the study, indicating that these differences in image interpretation were not due to chance.

Race comparisons

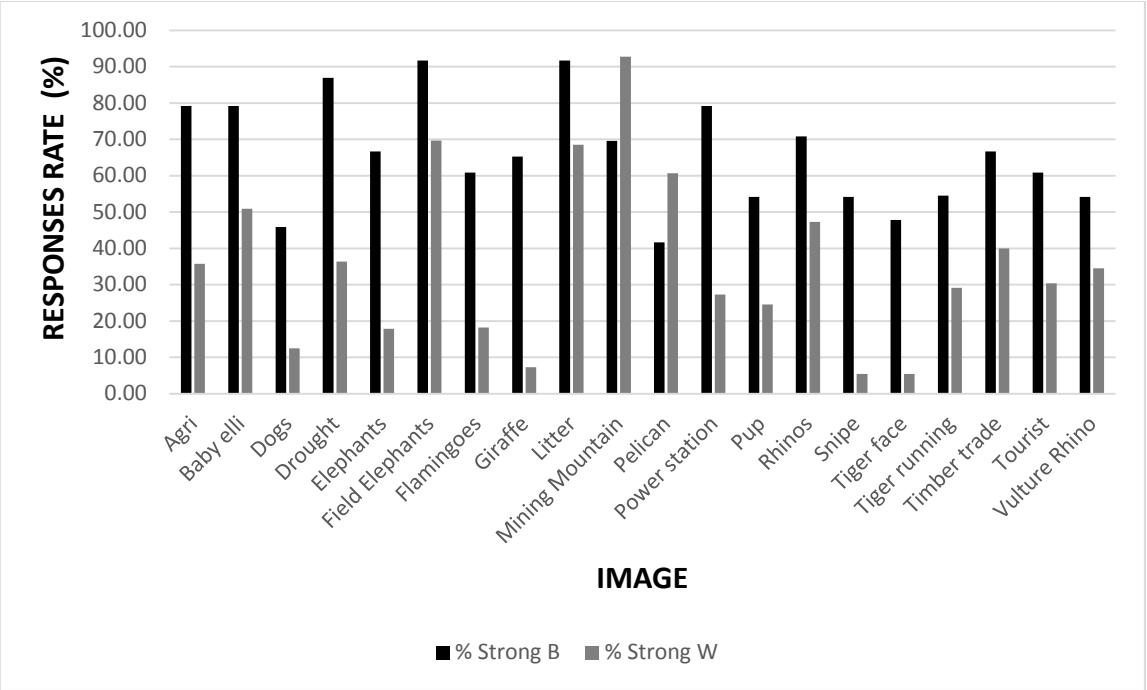

Figure 4.13 Black respondents (B) versus White respondents (W) comparison of strong responses differing by 20% or more

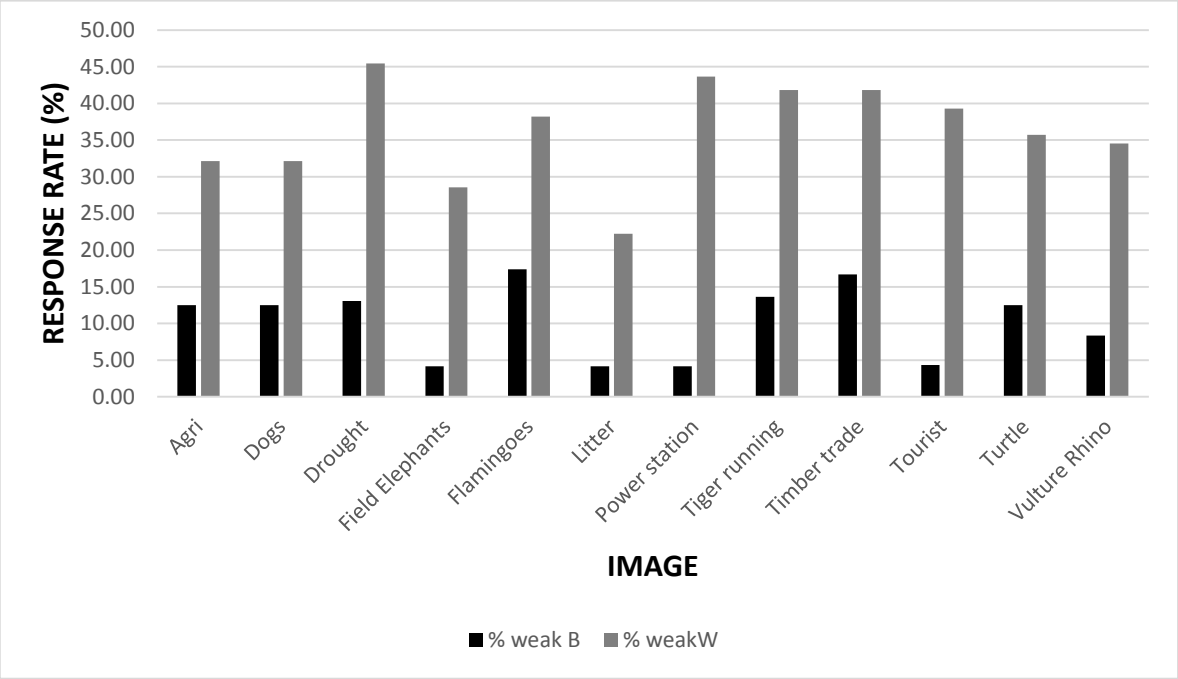

Figure 4.14 Black respondents (B) versus White respondents (W) comparison of weak responses differing by 20% or more

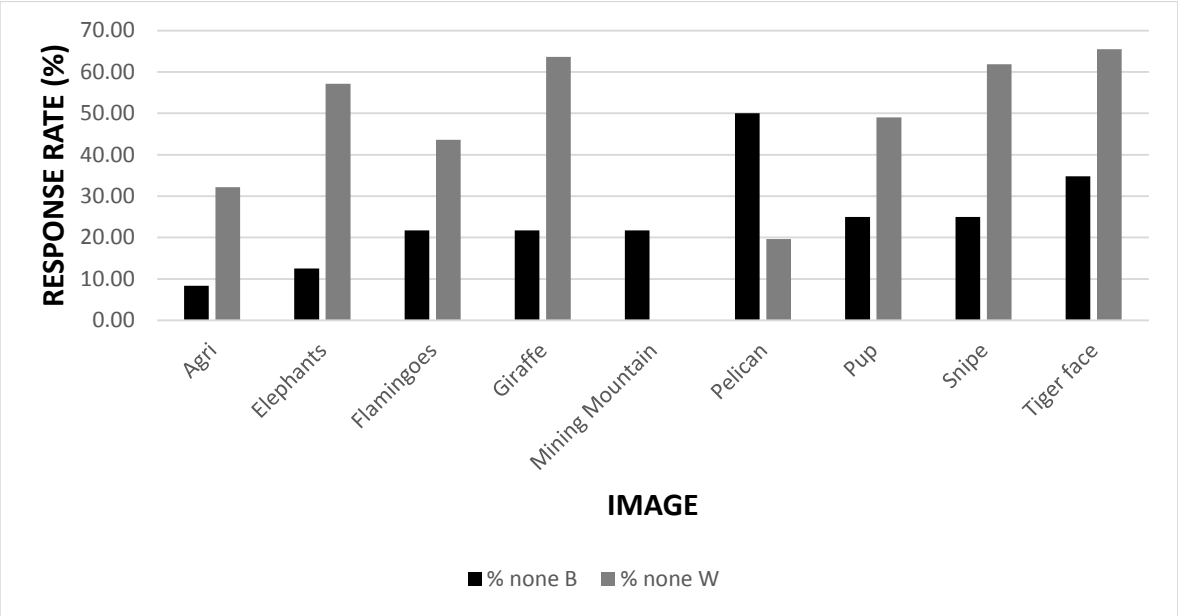

Figure 4.15 Black respondents (B) versus White respondents (W) comparison of no messaging responses differing by 20% or more

Statistically significant images in race comparisons

Out of the 20 images that were determined to have statistical significance only selected images were categorised into image subsets for ease of result discussions. 66.67 % of these images had p- values of 0. As p-values are interpreted as the probability of observing a certain result from observations, assuming the null hypothesis is true, the probability of these being due to chance are zero. Certain themes were evident in these subsets and none in the balance of the images of significance.

1. Subset one includes images: Drought, Power Station, Tourist, Timber Industry, Elephants in the field and Giraffes (Table 4.5)
2. Subset two includes images: Elephants, Tiger face, Tiger running and Baby elephant (Table 4.6)
3. Subset three includes images: Snipe and Flamingos (Table 4.7)

All of these images were rated as significantly higher by Black respondents as having strong conservation messaging.

Image subset one

Table 4.5 Statistically significant results in subset one

	Drought Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	0.0	**86.96**	13.04	17.0226	0.000
White participants	18.18	**36.36**	45.45		
	Power Station Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	16.67	**79.17**	4.17	19.6994	0.000
White participants	29.09	**27.27**	43.64		
	Tourist Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	34.78	**60.87**	4.35	10.8048	0.005
White participants	30.36	**30.36**	39.29		
	Timber Trade Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	16.67	**66.67**	16.67	5.5845	0.061
White participants	18.18	**40.00**	41.82		
	Field Elephants Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	4.17	**91.67**	4.17	6.1583	0.046
White participants	1.79	**69.64**	28.57		
	Giraffes Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	21.74	**65.22**	13.04	29.6204	0.000
White participants	63.64	**7.27**	29.09		

An outstanding feature of all of these images is that they are all found in rural setting and could be interpreted as images that depict environmental concerns. If interpreted in that context and applying the assumption that Black respondents may still have roots in rural areas, it is not surprising that these images were all ranked by Blacks as images containing strong conservation messaging. Applying the psychology of

interpretation to the results, these imageries could imply a threat to the environment and people that Black respondents value from a cultural perspective which would contribute to their strong responses. For example, water scarcity in rural areas is a harsh reality, power stations emissions affect air quality, tourism may have both positive and negative connotations and elephants may represent human- wildlife conflict which occurs often in rural settings.

The giraffe image had interesting interpretations. White respondents saw it as just a pretty picture of giraffes. Black respondents focussed on the background and saw it as diminishing vegetation and hence less food for the giraffes. Also interesting is that the image contained Rothschild's giraffes, which are classified as endangered, but was not noticed by any of the key respondents. This highlights the importance of framing images with context in conservation communication.

Image subset two

Table 4.6 Statistically significant results in subset two

	Herd of Elephants Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	12.50	**66.67**	20.83	20.0909	0.000
White participants	57.14	**17.86**	25.00		
	Tiger Face Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	34.78	**47.83**	17.39	19.7927	0.000
White participants	65.45	**5.45**	29.09		
	Tiger Running Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	31.82	**54.55**	13.64	6.5353	0.038
White participants	29.09	**29.09**	41.82		
	Baby Elephant Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	12.50	**79.17**	8.33	5.5369	0.063
White participants	29.09	**50.91**	20.00		

Images in this group feature two animals that have had significant exposure in standard media forums because of their flagship and charismatic status. This could be a contributing factor in terms of why Black respondents ranked these images as having high conservation messaging. If affluence is brought into the discussion, by the assumptions made, White respondents could have more access to a broader form of exposure and hence more prior knowledge pertaining to conservation issues of elephants and tigers. This could explain why they rated these images as weaker than Black respondents did.

Image subset three

Table 4.7 Statistically significant results in subset three

	Flamingos Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	21.74	**60.87**	17.39	13.8835	0.001
White participants	43.64	**18.18**	38.18		
	Painted Snipe Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black participants	25.00	**54.17**	20.83	24.8615	0.000
White participants	61.82	**5.45**	32.73		

Both images in this group are avian species which are not commonly known or promoted by standard media forums. Without prior knowledge, participants would not have known of the conservation efforts done in Kimberley, South Africa to protect the breeding grounds of the flamingos. 43% of White respondents ranked the flamingo image as having no conservation messaging while 60.87 % Black respondents ranked it as having strong conservation messaging. Reasons given did not mention the conservation efforts but rather focussed on overcrowding in the colony.

The image of the painted snipe also had a similar response trend. 54.17% of Black respondents ranked the messaging as high and 61.82 % of White respondents saw no conservation messaging in the image. Based on assumptions stated, less affluent Black respondents are more likely to have an insular view of the world and may have less exposure to birds like the Painted Snipe. It may be an unfamiliar species to Black respondents and was therefore interpreted as a rare or endangered species having a

strong conservation message. The remaining 8 images that showed statistical significance displayed no obvious emerging themes (Table 4.8).

Table 4.8 Statistically significant results that showed no obvious themes in race comparisons

	Turtle on Scale Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	25.00	62.50	12.50	5.6729	0.059
White	10.71	53.57	35.71		
	Pelican Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	50	41.67	8.33	7.8157	0.020
White	19.64	60.71	19.64		
	Adult Wild Dogs Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	41.67	45.83	12.50	11.3801	0.003
White	56.36	12.50	32.14		
	Skinned Pangolins Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	13.64	77.27	9.09	5.3841	0.068
White	1.79	78.57	19.64		
	Vulture on Rhino Carcass Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	37.50	54.17	8.33	6.1274	0.047
White	30.19	34.55	34.55		
	Mountain Agriculture Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	8.33	79.17	12.50	12.7856	0.002
White	32.14	35.71	32.14		
	Oil Covered Penguin Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	16.67	79.17	4.17	10.3559	0.006
White	0.00	89.29	10.71		
	Mountain Mining Image				
	N	**S**	**W**	**Pearson Chi^2**	**p**
Black	21.74	69.67	8.70	13.0121	0.001
White	0.00	92.73	7.27		

Age comparisons

Table 4.9 Statistically significant results by age

	Drought Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	66.67	29.17	4.17	8.7863	0.067
31-40	72.73	18.18	9.09		
41 +	41.51	41.51	16.98		
	Rhino and Calf Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	56.00	24.00	20.00	11.1154	0.025
31-40	80.00	20.00	0.00		
41 +	40.00	40.00	20.00		
	Tourist Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	54.17	16.67	29.17	11.3516	0.023
31-40	54.55	13.64	31.82		
41 +	27.78	44.44	27.78		
	Deforestation Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	92.00	0.00	8.00	10.3240	0.035
31-40	71.43	4.76	23.81		
41 +	68.63	19.61	11.76		
	Vulture Tagging Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	80.00	8.00	12.00	10.9167	0.028
31-40	80.95	14.29	4.76		
41 +	50.00	33.33	16.67		
18-30	100.00	0.00	0.00	9.4562	0.051
31-40	86.36	0.00	13.64		
41 +	87.27	9.09	3.64		
	Giraffe Image				
	S	**W**	**N**	**Pearson Chi^2**	**p**
18-30	40.00	20.00	40.00	11.5770	0.021
31-40	27.27	4.55	68.18		
41 +	18.87	35.85	45.28		

The sample group was divided into the following age groups:

1. 18- 30 where n = 25 2. 31-40 where n = 22 3. 41 and over where n = 55

17.5 % of images were interpreted differently by the different age groups (Table 4.8). No visible trends were evident and no previous studies or literature reviews were found to compare results or to base assumptions on. It is possible that these results could be a function of race and/or the self-identified categories participants fell into instead of the age groups specified. Further investigations into age are required.

Gender comparisons

The results of the study indicated that male and female respondents did not show differences in image interpretation except for the tourist image and the shark image which both returned p vales of 0.053. For the tourist images male responses were 41.67 % and female responses were 18.75% for no conservation messaging. On the shark image, 18.75% of males saw this as an image that had weak conservation content against 2.78% of females. There was no obvious reason for these differences.

5 CHAPTER FIVE – GENERAL DISCUSSION

The research had three striking findings:

1. The sample group found that graphic images of "shock and horror" conveyed the strongest conservation messaging
2. Demographics, in particular race, did play a significant role in interpreting visual representation of conservation messaging
3. Endangered status played a role in strong messaging choices but not in weak or no conservation messaging choices

The study showed that respondents did not see "charismatic" pictures as having strong conservation messaging. Instead images of "shock" value were ranked high in terms of strong conservation messaging. 90% and more of the key respondents found that the images that had a "shock and horror" value had stronger conservation messaging than the charismatic images yet these images are generally shunned by conservation communicators and editors alike and rarely make the covers of nature and conservation related magazines reflected by the results of studies discussed in the literature review by Heywood (1995); Caro & O' Doherty (1999) and Clucas *et al.* (2008). These studies were conducted over a decade ago and may be an indication that research into the role of flagship status and charisma may need updating. Studies need to be expanded in this area to see if viewers are ready for "shock" therapy to get them to respond to a call for action.

While these image responses confirms Myers (2006) statement that our primary reaction is emotive and "shock value" messaging relies on our ability to be sufficiently aroused to take action, desensitisation of the environmental threat is a concern of communicators as it could lead to the reduction of salience the conservation objectives. It is therefore proposed that a balance of images that convey aesthetics of species, environments and landscape and images that convey realistic portrayal of threatened situations is perhaps what is needed to effectively drive home conservation messaging. No studies of this nature have been conducted to my knowledge and may be an interesting avenue to pursue. Cultural context and demographics cannot be ignored in imagery perceptions. As indicated by the results, different population groups may view images differently and are likely to interpret images based on their past experiences and their beliefs and value systems. This is what Medin & Bang (2104) eluded to when they spoke of perspective context and relationships. As cultural cognition theories have only studied American culture (Kahan 2012), it would be dangerous to assume that these are transferrable.

The images chosen by the sample group as having the highest conservation messaging contained subjects that have endangered status and is an indication that endangered status may have played a role in image choices. This contradicts the research of Caro & O' Doherty(1999); Clucas *et al.* (2008) and Colleony *et al.* (2017). It is interesting to note that the netted turtle was the only choice in the 6 images that scored the strongest for strong messaging content that represented environmental concern to the sample group. Comments for this image choice ignored the endangered status of sea turtles and referred to the dangers of fishing nets to the ocean environment and included words such as "sea pollution" and "overfishing" (**Appendix C**).

Sheppard (2005) explained why people are less likely to be influenced by visualisation of climate change threats. He proposed that the effects of climate change are not immediate and it is difficult to visualise the effects if the threats are not perceived as a direct risk to an individual. This can be extrapolated to the environmental images and images of people and the environment. When images were perceived to have no threat to respondents, their responses were impartial.

Much of our choices are the result of subliminal messaging through various media platforms. The same is true for our perceptions of the animal world. Flagship status and charisma has been discussed at length in this report and both have been used extensively on media front covers, media coverage and conservation organisation for marketing conservation messages. It is possible that this has fostered disfavour towards endangered animal species that have lesser or no flagship status.



Figure 5.1 Wild Dog Pup



Figure 5.2 Baby Elephant

Figure 5.1 and Figure 5.2 are images of baby animals that were used in the study questionnaire. Both the African wild dog pup (Figure 5.1) and the African elephant calf (Figure 5.2) tick the charisma boxes. Neither possessed any strong conservation messages in the context of their framing. Both were positioned after images of their adult form in the questionnaire. Adult wild dogs are not viewed as the most charismatic of creatures while elephants are often described with words of human sentiment. Wild dogs are "more" endangered than elephants with less than 6000 remaining in the world. Elephant populations of the world exceed 100 000. The baby elephant however, on average, received more responses for strong message content and less for the weak and no messaging content as reflected. 52.58 % of respondents rated the baby elephant as having a stronger conservation messages while only 29.47% of the participants felt that the wild dog pup had a strong conservation message. In the weak comparison responses, 28.42% of respondents rated the wild dog pup as having a weak conservation while 23.71% of participants found that the baby elephant had a weak conservation content. In comparing no message content of both the images, the converse of the strong messaging results were found. 42.11 % of participants found that the wild dog pup had no conservation message while only 23.71 % of the sample group thought that the baby elephant had no conservation message.

A possible explanation is that elephants have both flagship and charisma status and are often characterised by anthropomorphic terms. Respondents used terms such as "nurturing, protection, safety" to describe the elephant calf. Elephants have also been more in popular media streams as opposed to wild dogs, subliminally positioning them in a better light both in terms of their charisma and their endangerment status. The deliberate positioning of the adults before the youngsters in the questionnaire could have also contributed to the results.

In an analyses of the adult images of these two species, if was found that 10 % more participants saw the image of the elephants as being stronger than that of the adult wild dogs and conversely, 10 % more participants felt that the image of the adult wild dogs had no conservation messaging. It is difficult to conclude that subliminal positioning may be responsible for this outcome but the outcome of this and other results of this study are good indicators that more studies need to be done to understand the use of imagery in popular media platforms. Conservation communicators should also be aware of the impact of their marketing and should reconsider the promotion flagship status over endangered status. A possible solution to overcome this biasness is to consider new flagships, devoid of charisma in definition

and with a focus on endangerment status instead as Kontoleon & Swanson (2003) suggest.

Another concept used in this report was context. Cultural context was discussed in both the literature review and in some of the demographic results. The inclusion of context in positioning a message is vital in getting the right conservation message across. In reference to the above photographs, the wild dog pup was part of litter of a breeding programme at Zimanga Game Reserve in South Africa and is part of the third litter that will be translocated to various regions in Africa to ensure survival of the species. The baby elephant image was taken at Addo National Park, South Africa, which has a healthy herd of over 600. The study focussed on assessments of images without caption or narratives. Armed with prior information and accompanying text it would be interesting to see if it would make a difference to the outcome of the choices of the participants.

Many respondents commented that images that had weak and no messaging content could have been enhanced for better conservation messaging if participants had "prior knowledge" and if "context" of the situation were given (**Appendix C**). Suggestions to explore this would be to expand the study to include tests of images in isolation against images in a series, test images with respondents that have prior knowledge against those who do not and test responses to images that have text and captions against those that do not have any narrative. A social study of this nature was conducted by Cope et al. (2005) on images from the Iraq war and is referred to in the literature review section of this report.

I would be doing the efforts of conservation communicators an injustice if I do not challenge the findings of Kalof *et al*. (2011) discussed in the literature review section of this report. They proposed that animals portrayed in a studio setting devoid of natural elements (Figure 5.3), creates a feeling of kinship with viewers and should be a consideration in conservation communication. Participants were asked to add connotations to the word "Animal" before and after the viewing (Figure 5.4.). Blocked and circled words are pre-exhibit descriptions and descriptions underneath blocks are post- exhibit. From word associations from the map themes of "kinship" and "personality" were attached to the descriptions.

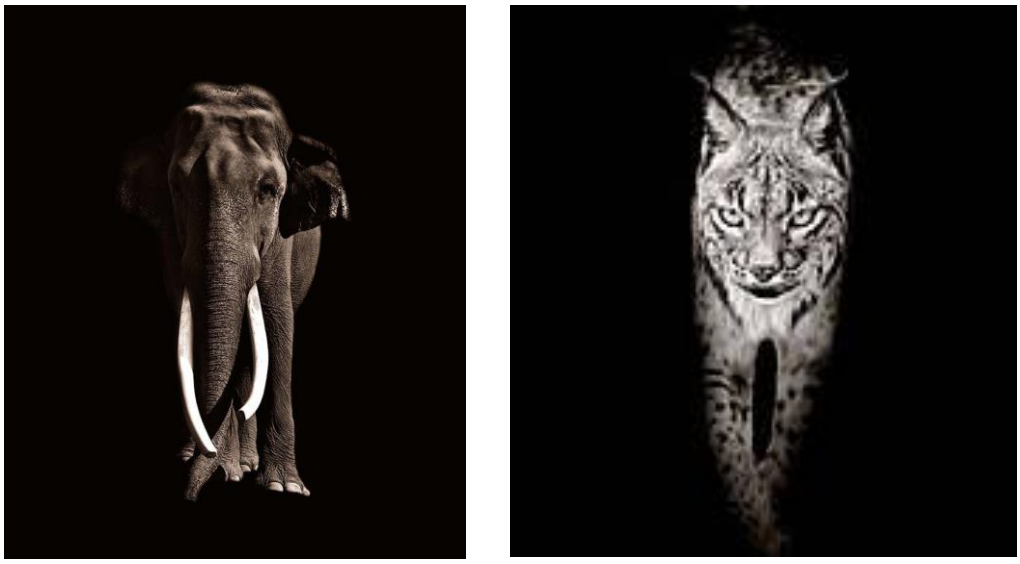

Figure 5.3: Representative of images used in Kalof et al's. (2011) study

(Image credit Zammit- Lucia)

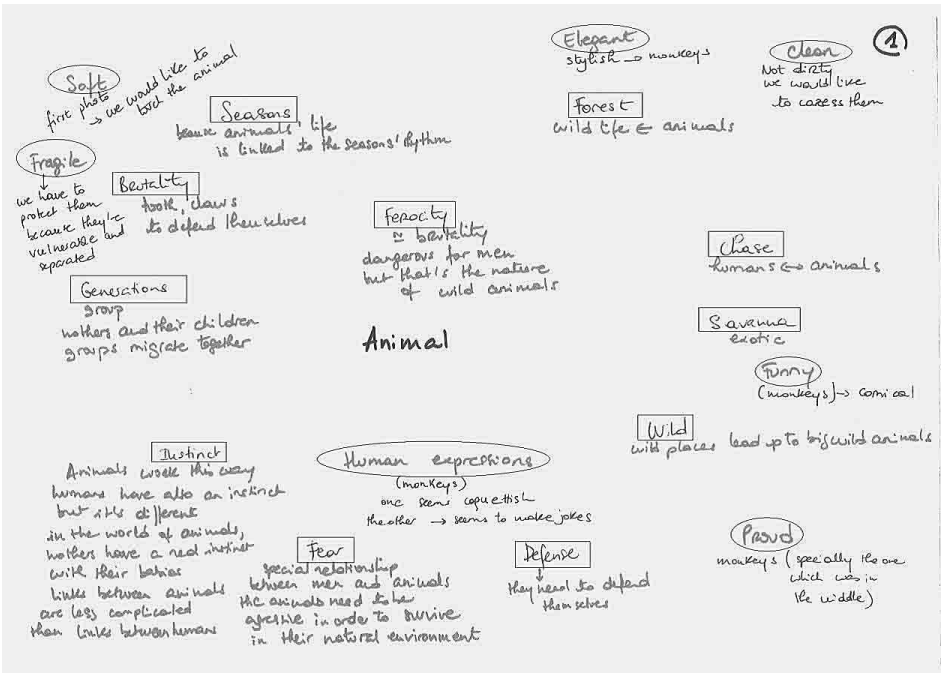

Figure 5.4: Personal meaning map (Kalof et al. 2011)

The exhibition was based on National Geographic's Photo Ark, a series with a mission to document every species living in wildlife sanctuaries for education purposes, led by conservation photographer Joel Sartore.

I found that the study had several limitations:

1. The participants were mainly French and the sample had very little cultural diversity
2. Sample size was small. Only 50 people participated it is assumed that they were all European
3. Little participant background information was known such as education and affluence status
4. There was no context attached to the images. It is assumed that these are images of captive animals
5. It is not known if the sample group had personal experiences with animals in a natural settings
6. Word association could take on numerous connotations. The study results were biased towards the words " kinship" and "personality"
7. Respondents were not asked if they would contribute to a conservation cause after the viewing
8. Respondents were not shown images of animals in a natural setting so there was no base comparisons between images in a studio setting and images in a natural setting.
9. The authors offer no explanation as to what imaging processing was used by the respondents to change their perceptions except that they had appreciation of the photographer's style of work.

Based on the above it seems unreasonable to suggest that the findings of this study have implications for conservation communication. It is alarming that this study has not been challenged by conservation communicators. The photographer's work was applauded by the media which may have also biased the results of a similar study the authors conducted in 2016 on a group of students. This again brings into question the role of media in contributing to our perceptions of the natural world.

Africa is unique and its land holds enormous biodiversity which is increasingly threatened as population numbers and development soar. Archi targets for 2020 to promote the values of biodiversity and the conservation thereof will fall short if basic human needs in Africa are not addressed first. Only by creating rural wealth can you create value links to the environment which can enhance and advocate for the

protecting of the natural environment. The future of Africa lies in education. Africa's children will be the continent's conservation ambassadors.

Through photography, children will become citizen scientists, contributing to a better understanding of the biodiversity issues that Africa faces. Some organisations have already realised the value of using photography as a teaching tool. Cameras for Conservation uses photographic exhibits to educate school children in Maun, Botswana about the beauty and frailty of our ecosystems. Wild Shots Education Outreach in South Africa equips rural school children with cameras and takes them to National Game Parks to educate them about their natural heritage.

Esaka Lebo Mantso, environmental educator at the Jane Goodall's Roots and Shoots programme in South Africa, is an advocate for photography as a tool for environmental education. "Photography is the one tool that can educate us about the environment without being bogged down with science facts and figures. If we give children cameras it will equip them to see their environment in a different light and will help create awareness in their communities. Promoting a culture of photography as a teaching tool in our townships gives children the opportunity to change their world one photo at a time (E.L.Mantso,pers.comm., 7 July 2017).

6 CHAPTER SIX – CONCLUSION

This study covered several aspects of the conservation story and focussed predominantly of the evaluation of images for conservation content, flagship and charisma status versus endangered status and their portrayal by media and the importance of context and cultural perspectives in image interpretation. To my knowledge, this is the first study of this nature to be conducted in the realm of environmental science. While there have been visualisation studies conducted in Europe and the USA, none have been conducted in Africa.

The field of conservation communication is deficient in studies of this nature and calls for more work to be done to address these shortfalls. The challenge is to create a persuasive moral frame that becomes a voice for the conservation message. The question posed to both scientists and conservationists is whether it is possible to use media inoculation to predict a desired outcome through the use of images for conservation messaging.

The main findings of this study can be summarised as follows:

1. Images with "shock" value were considered as having stronger conservation messaging than charismatic images
2. Flagship status and charisma were not used as criteria for conservation messaging interpretation
3. Demographics such as race, and by extension, cultural diversity did play a role in image interpretation
4. Endangered status was used as criteria in strong message interpretation but not in weak message interpretation

This has important implications for conservation communication and needs to be expanded with a wider sample to include general public opinion. The limitations of the study design have been listed in Chapter 3 of this report. It is worth emphasising that the technical aspects of photography that govern image choices were not considered in this study but may have well played a role in image selection. This is a discipline that should be considered in conservation studies to enhance conservation communication.

The outcome of this study gave a broad overview of challenges of conservation communication. The research findings are useful in determining a more focussed

approach to further experimentation in conservation communication. Suggestions for future investigations include:

1. A detailed study of the findings of this study, expanding to a wider sample group
2. Image presentation and positioning for effective conservation communication
3. The role of demographics in conservation messaging interpretation, both in Africa and abroad
4. Understanding how children and adults process conservation related images
5. Cultural effects on conservation message interpretation
6. Social media as a conservation communication platform
7. Flagship species of the future, devoid of charisma
8. Images choices for conservation strategies for Africa

It is difficult to refute the persuasive power of photography. Visual imagery evokes emotions and is part of how we make decisions and take action on a daily basis. This study looked at the power of photography in communicating conservation messages. Imagery has enormous potential to be used in promoting and coercing pro-environmental behaviour but conservation communicators need to realise that cultural perspectives and context need to be included in the framing of images to ensure effective message delivery to targeted audiences.

The main conclusion is that photography is an effective medium to advance environmental education and conservation communication strategies but more work needs to be done on population dynamics and flagship and endangered status in order to understand how to best position conservation messages to achieve a desired outcome with a targeted audience.

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APPENDIX A

Figure A 1 Questionnaire

Please mark your responses with an "X". There are no right or wrong answers and there are no repercussions for not answering a particular question(s) but it would be appreciated if you could respond to as many as possible for the purposes of this study. Please feel free to elaborate on your choice.

For the purposes of this study *"Conservation message" is a message that creates awareness around the subject and promotes the intervention for the protection thereof.*

NAME: Please leave name blank if you wish to remain anonymous.

AGE:

RACE:

COUNTRY OF ORIGIN:

SAMPLE GROUP. Please mark with an "X".

Photographer (involved in conservation)	
Photographer (not involved in conservation)	
Academic involved in conservation	
NGO	
Editor/ conservation communicator	
Wits post graduate student - Science	
Wits post graduate student - Engineering	
University Student – not Wits	
Other	

Please note that images used in the questionnaire remain the copyright of the photographer and may not be used without written consent from the owner.

IMAGE 1

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 2

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 3

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 4

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 5

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 6

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message IMAGE

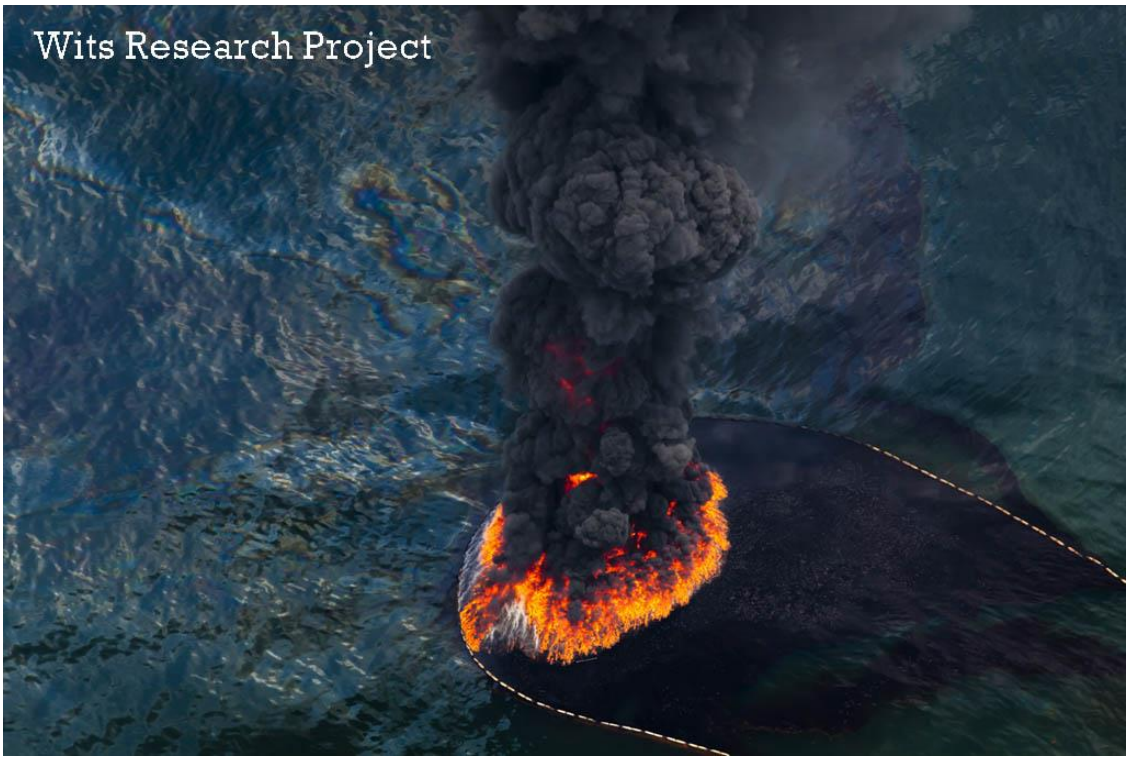


Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 7

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 8

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.

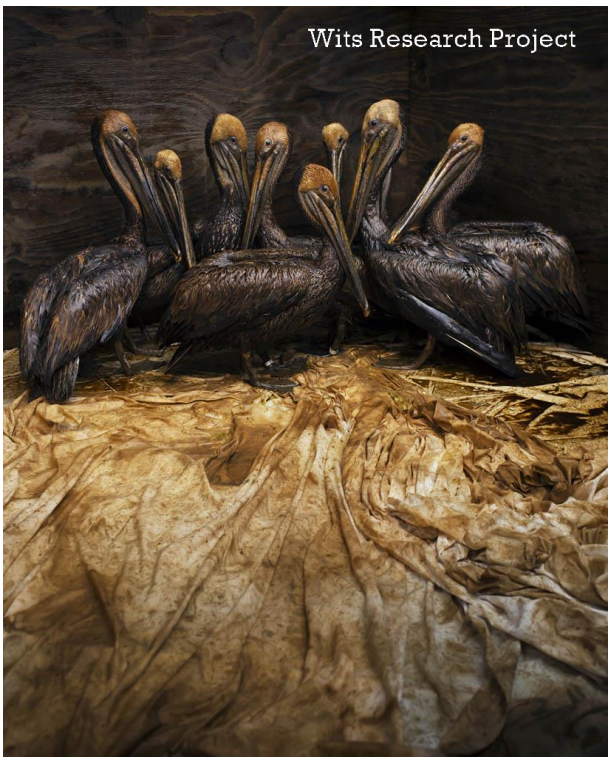


Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 9

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 10

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 11

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 12

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 13

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 14

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.

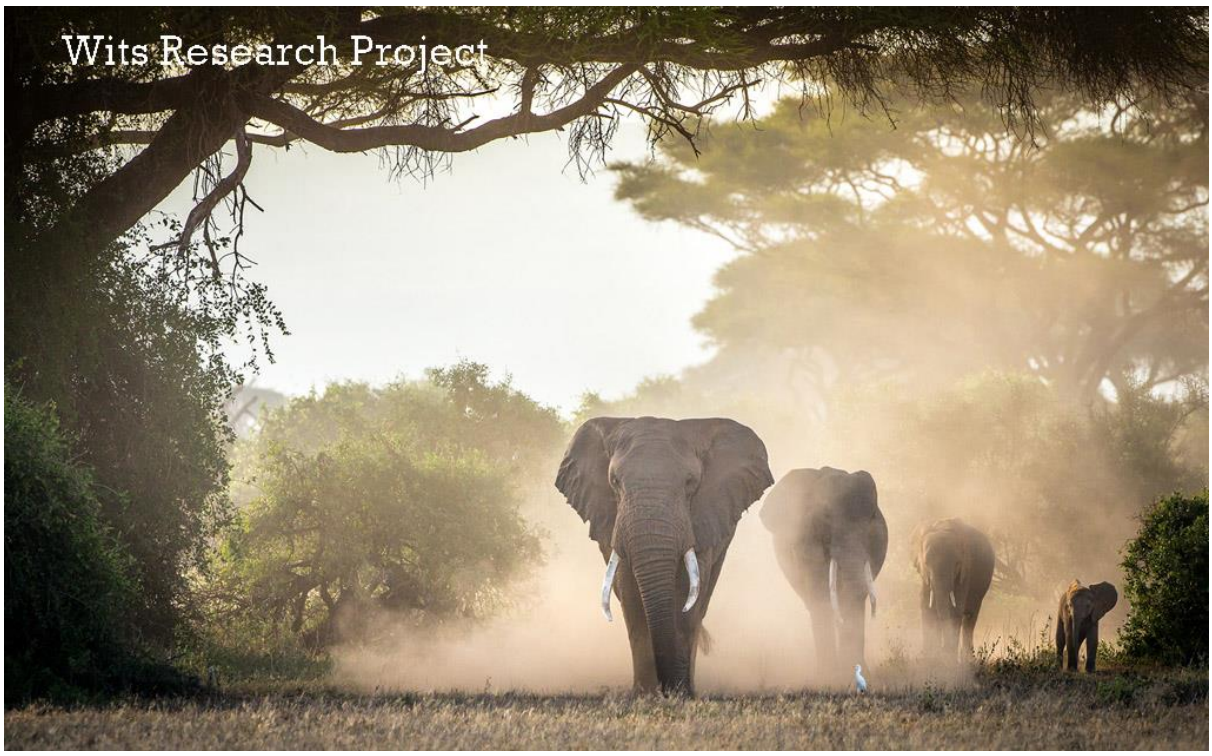


Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 15

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 16

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 17

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 18

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 19

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 20

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 21

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 22

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 23

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 24

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 25

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 26

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 27

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 28

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 29

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 30

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 31

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 32

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 33

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 34

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 35

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 36

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 37

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 38

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 39

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

IMAGE 40

Kindly rate the following image in terms of the impact you think it has in communicating a conservation message.



Weak	None	Strong

(Optional) Please elaborate on your choice

APPENDIX B

Table B1 Image credits and image categories

	IMAGE	PHOTOGRAPHER / IMAGE CREDIT	IMAGE CATEGORY (see Table 3.1)
1	Panda	Ami Vitale	aesthetics of species; plight of endangered and threatened species
2	Drought	Peter Chadwick	environmental concern
3	Jane (Goodall)	Jane Goodall Institute	people and the environment
4	Rhino and calf	Charl Senekal	aesthetics of species
5	Power Station	Prelena Soma Owen	environmental concern
6	Turtle (being weighted)	Gabby Salazar	plight of endangered and threatened species
7	Sea Explosion	Daniel Beltrá	environmental concern
8	Gorilla	Brent Stirton	plight of endangered and threatened species
9	Pelican	Daniel Beltrá	environmental concern
10	Wild dogs	Grant Atkinson	aesthetics of species
11	Tourist	Paul Kurui	people and the environment
12	Shark	Gabby Salazar	plight of endangered and threatened species
13	Gorilla series	Teagan Cuniffe	aesthetics of species; plight of endangered and threatened species; people and the environment
14	Pangolins	http://palawan-pangolin.blogspot.co.za/?_sm_au_=i2HHsN51j6mqS2FM	plight of endangered and threatened species
15	Elephants	Michael North	aesthetics of species
16	Vulture on Rhino	Charl Senekal	aesthetics of species; plight of endangered and threatened species
17	Pup	Prelena Soma Owen	aesthetics of species
18	Dehorning	Peter Chadwick	plight of endangered and threatened species
19	Agriculture (on mountain)	Paul Kurui	people and the environment; environmental concern
20	Deforestation	Daniel Beltrá	environmental concern
21	Polar Bear	Kirsten Langenberger	aesthetics of species; plight of endangered and threatened species
22	Tusk	Brent Stirton	plight of endangered and threatened species
23	Timber Trade	Green Peace Africa	people and the environment; environmental concern
24	Alluvial Mining	Daniel Beltrá	environmental concern
25	Snipe	Charl Senekal	aesthetics of species
26	Netted Turtle	Jordi Chais	plight of endangered and threatened species; people and the environment

	IMAGE	PHOTOGRAPHER / IMAGE CREDIT	IMAGE CATEGORY (see Table 3.1)
27	Tiger Face	Prelena Soma Owen	aesthetics of species
28	Oil Spill	Daniel Beltrá	environmental concern
29	Vulture Tagging	Endangered Wildlife Trust	plight of endangered and threatened species; people and the environment
30	Field Elephants	http://www.thevillager.com.na/articles/10214/Wild-animal-attacks-result-in-19-deaths/	people and the environment
31	Sharks on Beach	Pete Oxford	plight of endangered and threatened species
32	Oiled Penguin	Eve Gracie	environmental concern
33	Giraffe	Melissa Groo	aesthetics of species
34	Mountain Mining	Ami Vitale	environmental concern
35	Flamingos	Mark Anderson	plight of endangered and threatened species
36	Horn Measure	Peter Chadwick	plight of endangered and threatened species
37	Tiger Running	Daryl Balfour	plight of endangered and threatened species
38	Poached Rhino	Pete Oxford	plight of endangered and threatened species
39	Litter	Carolyn Monastra https://www.commonwealmagazine.org/witness-climate-change	people and the environment; environmental concern
40	Baby elephant	John Vosloo	aesthetics of species

APPENDIX C

Table C 1 Summary of selected comments for image choices by respondents

	IMAGE	STRONG MESSAGING	WEAK/ NO MESSAGING
1	Panda	Nurturing, symbolic of new life, protective instincts evoked, vulnerability of endangered species	Furry animal, Needs context, What is it?
2	Drought	water scarcity, drought	needs context, could be seasonal, would be strong if dead animals were in the image
3	Jane (Goodall)	Jane Goodall is easily recognisable, humans and animals can live together	human intervention , chimp being taught tricks, weak if you don't know its Jane Goodall, wealthy white woman playing with wildlife
4	Rhino and calf	good poster for conservation, draws attention to horns, bond between mother and child	Media fatigue, too many of the same around, placed in series with other rhino images in questionnaire will make it very powerful
5	Power Station	air pollutant; shows the scale of industrialisation on natural habitats	clean steam , image too warm, does not show pollution
6	Turtle (being weighted)	caring for animals, protection	just monitoring, just research, does not look comfortable, traumatic for animal
7	Sea Explosion	sea/ environmental pollution, forest fire	difficult to see what's happening,
8	Gorilla	strong sentiments, anger, horror, sadness, animal cruelty, powerful - no words needed, forces you to engage with picture, makes me want to do something to help	leaves too much to interpretation, would be strong if context was given
9	Pelican	oil pollution	not sure what this is saying, image is too pretty
10	Wild dogs	endangered	just a good picture, would need prior knowledge
11	Tourist	ecotourism, rich and poor divide, need to include local communities, poverty	not easy to understand , needs context, colonialism in scientific research and the marginalization of local peoples

	IMAGE	STRONG MESSAGING	WEAK/ NO MESSAGING
12	Shark	sharks being killed for no reason	not easy to interpret, if endangered shark was in the image with fin cut off it would be very powerful
13	Gorilla series	series tells a story about gorilla protection, works better as a series than images on their own	disjointed series of images, needs context to be interpreted correctly
14	Pangolins	http://palawan-pangolin.blogspot.co.za/?_sm_au_=i2HHsN51j6mqS2FM	plight of endangered and threatened species
15	Elephants	Shows the beauty of elephants	Just a pretty picture
16	Vulture on Rhino	endangered species	needs context and prior knowledge to be effective
17	Pup	endangered, cute, will appeal to donors, hungry pup	just a good picture of a cute animal
18	Dehorning	effort to protect them, powerful	intrusive behaviour
19	Agriculture on mountain slope	deforestation, not enough land to support people, not enough rain	needs context, if paired with a before image it would be impactful
20	Deforestation	deforestation , shows stark contrasts	looks posed, is it real?
21	Polar Bear	global warming/climate change, reduced habitat	bears look in good shape , media fatigue, clichéd, emancipated bear would be more hard hitting
22	Tusk	strong sentiments, cruel, sad, wish I could do something	Looks posed
23	Timber Trade	shows deforestation and scale of logging	could be sustainable industry, pollution/message not obvious
24	Alluvial Mining	habitat destruction, human impact on forests	needs context
25	Snipe		Just a pretty picture
26	Netted Turtle	strong sentiments, sea pollution, over fishing	
27	Tiger Face	endangered, very popular with readers	Just a pretty picture, too many similar pictures
28	Oil Spill	sea pollution	difficult to see what's happening, looks more like art, not obvious its oil

	IMAGE	STRONG MESSAGING	WEAK/ NO MESSAGING
29	Vulture Tagging	monitoring to protect, hands-on management	human intervention , cruel way to do research
30	Field Elephants	human animal conflict, wildlife encroachment on to cultivated land	disjointed series of images, is it about the elephant or the farmers, two different species
31	Sharks on Beach	human indifference, over fishing	could be sustainable fishing
32	Oiled Penguin	Can see exactly the effects of oil pollution	Poor image quality, too tight crop
33	Giraffe	habitat destruction, climate change impacts	just giraffes
34	Mountain Mining	deforestation, land degradation, shows strong contrasts	Could be sustainable
35	Flamingos	overcrowding, strong if you know the story	needs context, difficult to see what it is
36	Horn Measure	monitoring to protect	human intervention, cruel way to do research
37	Tiger Running	human encroachment	no obvious message
38	Poached Rhino	strong sentiments, makes you want to intervene	may be too graphic for sensitive people
39	Litter	plastic pollution, poverty, recycling	not easy to interpret
40	Baby elephant	nurturing, safety, protection, good symbolism, great for raising funds	just a lovely image

APPENDIX D

Figure D 1 Ethics Clearance Certificate

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Soma-Owen

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H17/02/27**
PROJECT TITLE	Conservationphotography: Evaluating the impact of photographic images in conveying conservation related messages
INVESTIGATOR(S)	Mrs P Soma-Owen
SCHOOL/DEPARTMENT	Animal, Plant & Environmental Sciences/
DATE CONSIDERED	17 February 2017
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	09 March 2020

DATE 10 March 2017 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Mrs I Watson

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES